

# Academia Arena

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# Academia Arena

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## 学术争鸣

Academia Arena is published bi-linguistically with English and Chinese for the scientists and Engineers. The journal founded in January 1, 2009 aims to present an arena of science and engineering. The Editor-in-Chief, Associate Editors-in-Chief and Editors have backgrounds in Philosophy, Science, Technology, Cosmology, Mathematics, Physics, Chemistry, Biology, Medicine, Civil, Electrical, Mechanical Engineering, etc. Papers submitted could be reviews, objective descriptions, research reports, opinions/debates, news, letters, and other types of writings.

学术争鸣于2009年元月1日在美国纽约马斯兰德出版社发刊, 主要目标为提供科学家与工程师及社会工作者学术辩论的发表园地, 专业领域包含哲学、科学、技术、宇宙学、数学、物理、化学、生物学、医学、土木、电机、化工、机械工程, 等, 编辑群将以最专业客观的立场为所有投稿作者服务。

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## 21 世纪新经络学导引

--- 21 世纪新弦学概论 ( 2 )

### 申之金

**摘要：**东方古代的经络与西方现代的弦论走到一起，是 21 世纪基础科学的一大奇迹。人体生理相似弦论研究的奇点，视界、黑洞，奇点处物理上引力如此巨大，数学上如庞加莱逆猜想的圈，类似血液、呼吸、消化、泌尿、生殖、神经等系统中的通道；视界联系体表的皮肤、经络；人体黑箱的生命力量类似黑洞。

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**关键词：**经络弦学 反 D-膜 量子曲率

### 前言

我们在《从庞加莱猜想到黑洞战争》中说过，物质在普朗克尺度所有的粒子都统一，也能统一，从引力子 胶子 氧 水 经络 低碳无核污染能源，其内在联系演进，是成熟科学从牛顿 法拉第 麦克斯韦 爱因斯坦 玻尔 费曼 彭罗斯 霍金 威滕 马尔达西纳 特霍夫特等一路堆垒走来，能证明的。东方古代的经络与西方现代的弦论走到一起，是 21 世纪基础科学的一大奇迹。但仅以目前祝总驥、张维波等著名经络学家的实验和认知来解读东方古代的经络，还存在三大难题：A、古人从何知晓现代化的经络；B、有形通道齐全何须再造无形；C、经络空隔脏腑信息何能翻转，没有完全说明。本文给予一些补充。

### 一、古人从何知晓现代化的经络

中国人在人身上寻找经络，就像西方人在大型强子对撞机上寻找希格斯粒子一样的执着。不是人身上经络没有，也不是大型强子对撞机不能产生希格斯粒子。正如萨斯坎德所说，是要重新装逼头脑。因为如人们能理解宇宙暴涨与希格斯粒子质量起源的等价，也就能理解大型对撞机能寻到质量谱规律表中顶夸克  $t$  一栏一起的最重粒子，也就接近或探测到了额外维和上帝希格斯粒子一样，人身上由于有通道功能的血液、呼吸、消化、泌尿、生殖、神经等系统的昭示，从古到今也引导人们把有生命力量的气血，抽象为像有形的血脉一样，称为经脉或经

络。这种抽象本身也没有什么大问题，但经络抽象是一种无形，经络敏感人与不敏感人区别也很大，所以从古到今证明经络存在的实验很多，但也有很多问题没有说清楚。

萨斯坎德说：“任何能形变，长度大于粗细的物体就是弦”。经脉无疑也是一种“弦”，甚至血液、呼吸、消化、泌尿、生殖、神经等系统中的通道，也是一种“弦”。但萨斯坎德研究的“弦”不是如血脉这种常见的长大于粗细的东西，而是如抽象的核弦 QCD 弦和基本弦。这也与经络的抽象类似；甚至我国经络经验的运用也许还可以说，树立了一种理论与实验、科学与技术互相依存、共同发展的弦学研发的互惠模式，并且还延续到今天，成为尚有大量问题等待人们去解决的一种多学科交叉的、充满挑战和活力的前沿研究。这也就是我们说的，人体生理相似弦论研究的奇点，视界、黑洞，奇点处物理上引力如此巨大，数学上如庞加莱逆猜想的圈，类似血液、呼吸、消化、泌尿、生殖、神经等系统中的通道；视界联系体表的皮肤、经络；人体黑箱的生命力量类似黑洞。

1、有人把我国传统的中医、经络等说成是区别西方还原论的整体思维，这不错，但不够全面。整体丢掉了细节真是整体吗？不，整体思维的这片天，有井下之蛙和井外之蛙两重天的区别。整体思维说到底是一种弦学思维，从普朗克尺度开始到未来，它包括了从引力子 胶子 氧 水 经络 低碳无核污染能源的序列和堆垒，这类似井外

看天。与之相比，把整体思维局限于  $a+(-a)=0$  类似的阴阳平衡、正负相消、有无相生的类似亚里斯多德的质料因，形式因，动力因，目的因的剖零科学和整体科学的分析，即使能构成一个完整的对立的序列，即使身在弦论，也只能是有目不识泰山。

1) 例如有人说，弦论是在没有新的实验引导理论猜测的情况下，一些理论家已经采用数学上优美和必要的概念来引导他们发明的一种新的物理思想。但是由于没有能力在实验上检验弦论是否能够成为量子场论的行得通的取代者，这使得其他物理学家失望。是这样的吗？其实证明核弦 QCD 弦的实验很多；基本弦的实验也不是没有，而是全球只集中在少数人的手里，大多数的人和机构没有那么多的钱和有能力的人去做。批评弦论派能做吗？他们的理论方案能解决基本弦实践类似的难题吗？卡西米尔效应起源于量子真空，即真空中两块平行放置的无限大中性导体平板之间存在吸引力，这是卡西米尔在 20 世纪上半叶就已经提出，大家也知道它正确，但直到 20 世纪末实验证明才得以完善。本身在形而上学考虑的不是弦论，而是批评弦论派，他们在井下能发现一幅整合的图景吗？能作出对这幅图景的演化以及演化模式和方向的令人信服的说明吗？支持弦学者是没有他们那副哲学功底的。

2) 庞加莱说，如果不借助于智力体系的设想，无声的事件将永远不会变成经验事实；没有理解，就不可能有感觉的显现会变成科学的经验。因此，一个科学理论，必定涉及到除了经验事实以外的，基本的或构成的假设或公设。经验事实可以指引语言变化的选择，它们能够决定性地影响经验假设的命运，但只是在一种选择的语言框架中。类似拉格朗日与哈密顿的分析力学理论与麦克斯韦电磁理论的原理物理学，旨在阐述数学原理，这些数学原理能够在两个竞争性理论基础上取得的经验成果系统化，表达普通的经验内容与这些竞争性理论的数学结构，因而对于不同的理论解释是中立的，容许其中的任何一种解释。

闵可夫斯基继此根据物理事件恒定地包含着位置与时刻的组合，把在某一时间点的一个空间点，即数值  $x, y, z, t$  的系统，称为“世界点”。从而得到了世界中的一条曲线，一条世界线的图象。闵可夫斯基把狭义相对论视为镶嵌在四维流形中，这种运动学结构表现为一种由闵可夫斯基度规  $g_{ij} = \text{diag}(1, -1, -1, -1)$  表征的编时几何学，他把物理事件表示为一个世界点上的几何对象，四维流形可以设想为物理事件的一个舞台。彭罗斯更是提出了沟通时空几何与量子理论的扭量理论，并引向了描述量子现象的复希尔伯特空间的图象。这种同构使得由定义了扭量空间的两个旋量部分构成的复数，必须与时空的几何紧密联系在一起，并且也以不同的

伪装，作为量子力学几率幅出现。而涉及到这些度规性的本质与解释时，奇点，视界与黑洞等三个概念对于广义相对论和量子力学的拓扑解释就成为关键的。这是一个漫长的堆垒，但为什么有人只把板子打在爱因斯坦身上，因为他们仅仅是作为批评弦论派或反相派而存在。

3) 王其学先生不是批评弦论派或反相派，而我们也正是从牛顿 法拉第 麦克斯韦 爱因斯坦 玻尔 费曼 彭罗斯 霍金 威滕 马尔达西纳 特霍夫特等一路堆垒走来，理解了张维波先生讲的“经络是水通道”，和古人把经络比作人身上的“河流和湖泊”的。但张维波及古人观点与引力子 胶子 氧 水 经络 低碳无核污染能源的弦学互惠模式的联系及先见之明，也有王其学先生前说的“经络难题”：古人是从何知晓现代化的经络？

2、王其学先生在《最早发现经络的，是人还是神？》的网文中，追问了费伦教授，也类似在追问祝总骧、张维波等现代著名经络学家的实验和认知。王其学说，费伦教授以现代实验手段证明经络穴位的形态学位置，是在以结缔组织为基础，连带其中的血管、神经丛和淋巴管等交织而成的复杂体系之中，形成具有综合的复杂生理功能的某种生理结构；发现在与穴位位置相对应的深层结缔组织结构中，富集有钙、磷、钾、铁、锌、锰、铬等元素。并且结缔组织中呈液晶态结构的胶原纤维，具有一个高效率传输红外光的特征波段，这预示着人体内部可能存在着一个生物光子系统，在生命信息、能量的传输交换等生理活动中起着极其重要的作用。于是王其学追问费伦：如此细密、如此精密、如此缜密的人体经络，早在数千年之前的中国古人在没有电的知识，没有任何电器设备，没有 X 光之类，无法借助射线投影、成像之类的仪器观察；没有显微镜，没有放大镜，就连近视镜、老花镜也没有下，又怎能发现人体经络？是凭了什么样的科学仪器、先进技术和本本能耐，发现了人体经络的？

1) 我们早在《费伦教授与量子色动化学》的网文中作过回答：靠“自然全息”。

弦学的最高境界，如特霍夫特所说，世界是一幅全息图。所谓自然全息，就是一种由此及彼的自然联系与思维联系的印记。《黄帝内经》之时的古人想到经络，从自然全息方面得到说明，是因为古往今来，人类社会的发展都得惠于人们自觉或不自觉地对探微知著的自然全息的运用。例如古代医学家观察到阴阳是天地自然界间的一些普遍现象，因此把人同

自然密切联系起来，用来概括和演绎医学上的一切问题。说到经络，更是从自然界联系地面上有河流和湖泊，想到人身上也应该有“河流和湖泊”，创造性地把指人身上的河流，络指人身上的湖泊的。再通过广泛的全息模式联系和实践探索，系统地阐述了人体经络的起止、循行、络属、交合、俞穴、分布、症候、主治等问题。这里经络对应的河流和湖泊都有水。

2)再说地面上的水，到处都有，但河流和沟渠只出现在山谷和平原的低渠道之处。这与张维波认为经脉是指组织间隙，营卫之气指人体中的组织液，经络是组织间质中具有低流阻特性的多孔介质的组织液通道，其中存在向经脉和沿经脉的两种组织液运动及流体性约束，也是一致的。这里不管是组织液还是凝胶、都含有大量的水。水里含有氧，经络和水、和氧有联系吗？这正是 QCD 化学要讨论的问题。而承认古人这个水系统的经脉系统，到今天也继续承认机体有 365 个溪谷，承认机体有 12 条水渠道；穴位的名称迄今还沿用近似湖泊的名称，如曲池、后溪、合谷等。但古人没有只停留在自然全息思维，而是早在五千多年前伏羲氏就已运用到实践上，教人用“砭石为针”，“以痛为俞”的方法，在体表某些部位，以被荆棘或石片刺伤能使体内的疾苦或疼痛减轻作验证，从而发现了“穴位”。进入青铜器时代，砭石改成了金属针，可以扎在更精确的穴位上，并可引起经络感传现象，使经络成为中医理论最重要的内容之一，进而指导着如针灸、推拿、按摩、气功、中医等临床实践学科。

3)张维波说：“经络研究才刚刚开始，它属于 21 世纪的科学”。但即使张维波用上了现代化仪器和生物流变学及生物力学，他也仍然需要自然全息的引导。张维波生于 1961 年，大学就读于中国海洋大学，1983 年师从祝总骥教授当研究生。他概括出“经络是低流阻的组织液通道”；他回顾其历程说，祝总骥教授解释《黄帝内经》中的“中气穴，则针游于巷”，讲“巷即空”。空不就是组织中的空隙吗？而肌肉间隙就是最明显的组织空隙。“卫气组织液”是皮肤和肌肉表浅间隙中的组织液；而“营气组织液”是位于比较深部的筋骨间隙、关节腔及脏腑间隙中的组织液。但他还觉得有很多问题没有解决：1990 年初发现同位素循经迁移现象报导后，他从小型猪上实验看到注射到低流阻点的同位素孵得，沿着低流阻点的轨迹迁移时，才真正证明了同位素是沿着低流阻通道迁移；但 20 世纪 60 年

代初虽否定了朝鲜金凤汉所宣称发现的“凤汉管”结构，然经络研究界仍习惯上认为扩散性物质的定向运动应该有管道的约束。为了破释矛盾，他长时间地思考约束同位素分子的动力学原理。

终于一天他想到大学时学的海流知识：海流就是一种无管道的流体运动。将一个漂流瓶扔到海里，它会随着海流漂到很远的地方，而不会离开海流的路线。因为流速大的地方压力较低，故可以形成一种液体压力的约束。如果同位素循经迁移就像海流中的漂流瓶，经络就是通过流体运动形式形成的无管道的流体约束。这不就是经络联系海流的自然全息吗？

## 二、有形通道齐全何须再造无形通道

有人说，由于经络学说与经络临床应用已有二千多年，所有中医的医术都是以经络为核心，如果人体没有经络的话，整个中医体系的理论都要改写。但由于东西方文化的差异，西医一般都不承认人体存在经络，理由是解剖人体根本找不到经络组织。中医学虽然理论和临床上应用经络，也有人论证经络可能是电磁波、电化学的振荡，有量子特征，但经络界各自为战，也还说不出准确统一的经络在人体中的具体形态，到底是什么？它真的存在吗？中医也只有宏观综合的气、阴阳、脏腑、经络、证等基本概念，没有 21 世纪量子引力微观分析的内容。比如气与阴阳的实质，脏腑的功能与“证”的状态，都具有不能彻底澄清的复杂的微观内涵。有人说，这只能靠中医师自己讲。但只靠中医自己能说清楚吗？

一方面我们不能把中医说得太玄，中医理论体系形成于距今约两千年的战国至秦汉时期，其标志是《内经》、《难经》、《伤寒杂病论》和《神农本草经》等医学典籍的问世。而中国医药学的历史早有五千多年前，由于易经和阴阳五行学说的介入，就盛行天地万物普适的阴阳哲理与人体实际的结合；“天地万物，阴阳为本”；“升降出入，无器不有”；“三阴三阳，生命之门”；“阴阳变化，天人相应”的法则。落实到人体，控制着人体生命活动激抑有度地变化；人与天地环境息息相关，事物彼此相互依存、相互制约、相互转化，存在着生克乘侮的共同规律，构成中医整体性理论的基本框架。有人说，仔细想来，这个基本框架没有什么不对，没有不科学之处。

1 弦学走向全息，统观世界的医学科学，有古代产生的经验医学和近、现代发展起来的实验医学。

显然，中医的人体解剖知识是直观粗略的，对于内脏器官生理功能的推测也难免存在错误。但中医对于人整体功能层次生理病理的认识是全面、系统、正确和独到的。有人说，只要把中医的理论成果如实定位在人的整体功能层次上，则所有对于中医理论科学性的怀疑，就能烟消云散。但中医界有这种 21 世纪新弦学知识的堆垒和思想学习的准备吗？

1) 因为认真说来，中医、经络是属于 21 世纪新弦学范畴。中医凭借“望、闻、问、切”的古老的诊断方法，虽然原始，但符合射隐弦和量子射影几何及射隐几何的原理；经络类似河流和湖泊，更是天才的猜想。中医的摸脉，经络的针灸、拔罐、穴位敷贴、刮痧，推拿等广泛应用，更类似原始的拨动琴弦。反之弦学更是贴近中医、经络。《从庞加莱猜想想到黑洞战争》中说过，特霍夫特提出的全息原理，本身也含有庞加莱猜想翻转问题，能够解决信息不丢失和多维等价三维等物理之谜，但本身也还不够完善。这就是要认识全息、制造全息，必须要有类似两种相干粒子的对撞。这会遇到类似“羊过河”寓言故事的难题：在一维空间的桥上，两只相对而行的羊，在桥中间如何交换位置？萨斯坎德“持球跑进”，只是更挑明了全息原理的不够完善。而 20 世纪 60 年代初继三旋理论提出的自然全息律，抓住激光全息摄影中需要两束相干光线，升腾为自然全息对“两者相干”的注意。这落实到中医、经络，是既要有人体病理、生理等信息从内向表的发散，也要用人类社会一路堆垒的正确科学硬件和软件的对撞，才可持续发展。例如，QCD 全息原理与庞加莱猜想翻转引理结合，可应用到将来地震和经络信息等的观察预报上。其原理类似功率谱定义分析的方法：随机的噪声为白色噪声。黑色噪声是比棕色噪声的关联性，更强的噪声。从地震到经络等类的自然演变都是黑色噪声，它们的更强的关联性结合 QCD 和 QCD 化学等深层次机理，可以被翻转、被预测。

2) 在我国用生物全息最早直接研究经络学的，是著名学者张颖清。可惜他仅是抓住与激光摄影的全息效应“部分与部分、部分与整体相似”的联系，搞的经络学。这与古代经络类似河流和湖泊，并联系循经感传、循经麻木带等现象定穴位不同。张颖清以部分与整体相似定穴位，以找最痛处下针，揭示了经络学研究的不够完善。另一方面，在一次全国

全息生物学讨论会上，据他推荐的一位姓夏的国家体委运动员训练中心的保健医生说，他根据张颖清的方法，在训练基地试验，约一个小时能给一百多人治病，且效果显著。但也有人说，象肩颈痛的病人，原因是血热引起的，整脊、针灸、方药整来整去还是痛，而只须用药物清血热就不痛了。我们没有否定张颖清生物全息的意思，笔者和张颖清认识较早，也多次交流过，他在扩张全息思路上比较封闭，对 QCD 全息原理的进展听不进去。这也是很多经络学者的特点。张颖清后来受人攻击，成为继金凤汉之后，第二个英年早逝的国际知名经络学者。

3) 所以有人把西医对经络、中医的不理解，责任完全推到西医上，是不客观的。例如有人说，及至时代发展进入微观分析，出现了剖析人体的一系列成果，中医才碰到了麻烦，碰到了基本概念难以说清的问题。整体性的经络学说和客观存在的人体经络系统直到现在都没有被西方世界所接受和认识。然而，微观层次的结构和功能研究则是西医的盲点。西方医药学基本上是沿着一条方向向下的深入微观层次的结构与功能的研究，但中医学作为宏观整体医学，将永远与微观分析医学并行发展。因为微观分析研究再怎么发展，也注定象牛顿的经典力学尚能永续利用，它可以作为低速特例而被包括在量子力学体系之中。

4) 21 世纪新经络学，正是把古老的经络、中医弦学包括在 21 世纪新弦学体系之中的。这也是批评中医的人不理解的。批评中医者的不客观，也是显然的。例如有人说，中医凭“望、闻、问、切”这些原始的、古老的方法，对一个患了“已病”的患者，也弄不清究竟是患的是什么病，何谈知“未病”？中医有一个万灵的法宝，就是中医使用的语言，连中医内部都无法交流沟通；无人能明白中医郎中说的什么，就无法验证中医说的是对还是错。

对此我们赞成钟南山院士的回应：肿瘤、心脑血管病、慢阻肺、糖尿病等，这些都有 10~20 年潜伏期，以中医“治未病”的理念，若能通过改变生活方式及早预防，可降低死亡率。以前西医，是简单地把肿瘤给杀灭了，最后发现瘤没了，人也死了。说中医只有中药还可验证，可能讲得太绝对了。中医整体治疗和治未病的理念是科学的，会汇入世界医学主流。



2、从张颖清的生物全息经络学开始，我国的经络学界在改革开放以来，努力学习国内外的研究方法进行鉴定和创新，从伯纳德的没有脑袋的生理学的躯体稳态说，贝塔朗菲的系统论，维纳的控制论，普里高津的耗散结构理论和自组织原理，到哈肯的协同学，已经是用尽了力气。得出了诸如人体经络系统是一种适用于系统理论、信息论、控制论等的通讯和自动控制系统；经络是组织液与资讯的通道；经络是人体的无线信息网络、生物电网络系统；经络是包括红外线、静电、磁场等信息和能量，包括各种运载蛋白、酶蛋白、神经肽、激素、及血凝系、纤溶系、激肽系、补体系等各式各样的蛋白质，包括各种免疫球蛋白、抗体、各种细胞因子如白细胞介素、干扰素等，包括脑啡肽、内啡肽、强啡肽等内源性阿片肽的脑内神经细胞分泌的经气递质，参与淋巴细胞等免疫细胞调节，形成神经-内分泌-免疫-循环系统；经气系统是各种神经元、各类感受器、心血管、消化道、肌肉等组织细胞，在各种刺激下能产生由于膜上离子通道发生变化的电兴奋的，受体系统及其胞内信使系统与神经系、内分泌系、免疫系、消化系、循环系、呼吸系等配体系统共同组成的经气化学分子网络系统；经脉和络脉是带电磁场的毛细淋巴管，及其在淋巴组织中产生和生成的淋巴细胞和浆细胞；经络是用脉冲电和机械叩击刺激相结合的方法，在患者身上查出的一种特异的信息传导轨迹的低电阻点、压痛点、敏感点等结论。

1) 以上经络研究者们虽然是多多益善，但说得再多，经络仍是原来那个老难题：有形的神经系、内分泌系、免疫系、消化系、循环系、呼吸系等配体系统通道齐全，何须再造无形的经络通道？这类像一个世俗国家，从中央到省、市、县各级政府，行政部门齐全，有交通部、教育部、财政部、公安部、司法部、商业部、农业部、文化部、水利部、税务部等等，上下交流信息畅通，功能职责有序，但还不行，还须在它们旁边建一座无形的神庙，设一些无形的神祇来控制帮助吗？

2) 我们曾想以聚焦与散射现象来解答。这种现象可以联系到深山野林里讲话产生回声，二次曲面如探照灯在焦点处的光源能集中射得很远等来类比解释：人体是由很多相对独立的部分所组成，如果把每一个相对独立的部分，都看成象二次曲面存在

有一个或多个焦点那样的现象。当然产生聚焦的原理跟二次曲面的几何性质是风马牛不相及的两码事，但这却和类圈体的三旋是相关的。万事万物的弦学量子层次要靠类圈体的联络，要联络，就要讲支付选择。从支付选择上说，总是有一种相同的支持选择，才形成了相对独立部分。这类似一种“表面”，也是一种“旋”。游离或意识解耦释放的类圈体或类圈体群，碰在这种“表面”上而发生反射，就跟抛物面或椭圆面的聚焦或反射一样。这种功能跟神经和血液系统传递信息、物质和能量的鲜明性、清晰性比较起来，正象在深山野林藉助回声喊话和现代社会里用电话、电报传话一样不可比拟。但不能说人类进入现代社会，因有了电话、电报，深山野林里具备的那种天然产生回声的功能就消失了。人体的经络、穴位的情况就类似于此。人类虽然进化了，有了高级的专门的神经血液之类的传输系统，但人体的经络、气血功能并没有消失。

3) 以上解释虽然强调了经络的无形，但功能之弱形如配谈，并没有古人说经络有如气血那么强大的作用。无形又强大，从人体量子弦学的奇点，视界、黑洞联系人类社会，我们想到了新闻传媒报纸：任何一个现代世俗国家，不管是有新闻自由还是没有新闻自由，总办有报纸、杂志等新闻传媒。报纸早有“无冕之王”之称，但却不在政府行政的部门之序列，报社也没有直接管理这些行政部门的责任，但新闻却可以传播给所有的部门和人群。这种机构的存在又类似漂浮，相对说来类似“无形”。但它们发挥的新闻监督、新闻聚焦，作用又是强大的：即使有权势的部门和人士，如有不利的真实的要害事实被抓住，新闻一旦披露都会产生社会压力或震撼；即使这种作用是不确定性的。这类似“量子”性，也类似“视界”性。

4) 再说人的大脑意识，这种“无形”人人能感觉到，人人都拥有，难以否定，且对应宏观效应。如果说意识有量子性，它也生于大脑。但经络不在大脑。联系新闻聚焦，这也不同于回声的结构聚焦，也不同于河流、湖泊与海流的结构聚焦。用来对应经络，如果经络也是人体的一种量子意识，那么回声用空气分子作传播，河流、湖泊与海流用水分子作组装；显然经络量子意识的传播不是分子水平，而应在 QOD 层次。这是从古到今所有自然全息一路堆垒

走来的成果，因此到目前，也许才可以给经络下一个完整的统一的确切的定义：

经络是通过组织液截景传播的一种人体量子意识的流形聚焦与监督。

### 三、经络空隔脏腑信息何能翻转

《黄帝内经》说：“精津液脉气血，六气为一气。”并把人体分骨部、皮部、筋部、脏腑、经络和水系统。弦学的经络定义也有要说明经络空隔脏腑，信息何能翻转的疑问。例如中医常说气：人体死亡中医说是断气；气聚有人，气散无人；气即生命。这与西医说的停止呼吸不同。中医的气也类似意识，人在有意识，人死无意识；但这与西医说意识也不同。再如阴阳、津液、脏腑、寒热、证等中医概念，对应自然常识有相似，又模糊不相似。有人说，古代医家讲脏腑，是把人体功能归类作的标示符号；“五脏六腑”所概括的并不局限于体内相应脏器的功能。中西医很难结合，但中西医可并举来发展。中药两千多年的经验积累了不少好东西，但到底有多大用途，必须迈过循证医学这道“门槛”。如何迈过？弦学经络定义是一办法。这定义与李定忠教授说“经络是组织液与资讯的通道”看似相像，但本质是两个层次。

1 直面类似“中医已死”的极端指责，不管他们是懂当代医学的，还是懂前沿基础科学的，可以理直气壮地说这是错误的。当然，如果说古代的许多著名中医人物，不仅懂得当时的社会和文化，也懂得当时的自然科学，那么现代由于前沿基础科学迅猛发展，大多中医师不懂当代自然科学数理前沿，或者只懂中学、大学课本教的数理科学，这一现象肯定会影响弦学中医的发展。如何解决？是一个需要研究的问题。这里也涉及像一些媒体片面的宣传，目前包括超弦和圈量子引力理论的所有试图把引力场量子化的理论，都存在问题的误导。说这种话的人，即使是研究弦论的，也只是知道科学殿堂内的人搞的超弦和圈量子引力理论，并不深入知道科学殿堂外的人研究的 21 世纪新弦学和新经络学的发展。

1) 在某些批评弦论派物理学家的宣传的误导下，即使科学殿堂内的教育数学家，即使懂得弦论高等数学如泛函分析、微积分的人，也编不出一本更适宜于教学和学习普及 21 世纪弦论的数学书来。例如庞加莱猜想证明联系 21 世纪的弦论，但教育数学翻来覆去老师教，学生学的都一个世纪以前的数学概念，世界弦学大国梦能实现？当代超弦和圈量

子引力理论迅猛发展，教育数学家只熟悉、只知道可以换一种教法、学法能行吗？我国近 60 年的教育数学的成效，不是在数十年后的今天已显现出来了吗？如果这些有责任感的教育数学家，能以历史的眼光推进世界弦学大国梦的教育数学，在课堂上如能情深意切，把弦学数学变得生动有趣，使人在轻松阅读中领略弦学数学的神韵，识破弦学数学的玄机，揭示弦学隐藏的规律，发现不同中的相同，从根本上改变读者对弦学数学教育枯燥难懂的印象，以新的视角和方法处理弦学数学的老问题，何愁中医不爱弦学数学？13 亿人中少懂超弦和圈量子引力数学？

2) 21 世纪超弦和圈量子引力理论及全息原理，走到庞加莱猜想获证，什么是量子的答案已经有了眉目。即使拿起苏步青教授等 1979 年出版的《微分几何》认真学习下去，也会明白用欧拉-庞加莱示性数计算，奇点与亏格联系环面是相似的。说穿了球面量子亏格为 0；环面量子亏格为 1。奇点是环面收缩的结果。反之奇点放大看类似环面，也就是我们说的曲点。以此循序下去，开弦对应庞加莱猜想正定理，涉及球面；闭弦对应庞加莱猜想逆定理，涉及环面、奇点、曲点。球面和环面联系能量守恒，庞加莱猜想外定理涉及热力学，庞加莱猜想翻转引理涉及信息守恒、维数守恒。所以庞加莱猜想定理联系三旋求衡和量子自旋在宏观与微观的全息图像。在这些世界科学最高峰的攀登中，早已闪现出我们中国攀登者的身影。

3) 中医只从哲学考虑，即使整体思维，也全息不全。像张颖清以前经络研究中所指的全息，只是一种模式，说它是类比又不是类比，说它相似又不相似，说它是缩影又不是缩影，说它象重演又不是重演，说它象归纳又不是归纳，说它象演绎又不是演绎，说它象直觉又不是直觉……因此说弦学是全息，中医是全息，只能赋予它一个 21 世纪新弦学和新经络学的新概念。一句话，给“全息”增添一种弦学奇点，视界、黑洞解释，能回答经络第三大难题。

2 现在从量子曲率、量子点、量子射影几何，联系探照灯的类比简要说明如下。按古人说经络可以通达“五脏六腑”，但今天还没有任何直接的实验能证明；所有实验都还集中在皮肤层次。皮肤与五脏六腑虽然有曲折的实体管道通行，但与古人说的循经传感路线不符。循经传感路线上皮肤与五脏

六腑有空间断层相隔，经络空隔脏腑，信息何能翻转？

1) 《从庞加莱猜想到黑洞战争》中说过，反德西特 (AdS) 空间，其“反”表示空间曲率是负的。可以做许多小盒子。在三维中，如果盒子是球形，意味着内部是一个球。D膜是有黏性的，如果把它们带到一起，它们将黏在一起，形成一个有若干层的 D胚垛。卡西米尔平板效应是在两个平板之间有一种吸引力，把卡西米尔效应平板称为 K板。从无黏性出发，反 K板相当于反 D膜；有黏性的 K板，相当于 D膜。再把这些处理成“量子点”，加上量子曲率解释和将量子编织态概念引入，如果反 D-膜等量子编织态的量子曲率近似于半球形的抛物面，用探照灯的原理对量子点进行描述，由于丹麦科学家已经用实验证实，量子点具有类似旋转和强弱发射的效应，那么联系经络就不仅类似海流，而且具有海船之间相互用类似探照灯光打信号进行交流的能力。这里已把循经传感、循经麻木，退放到是一种力化学层次，经络量子点聚焦反射的“光量子”，当然只能是 QCD 层次的东西。

2) 进一步地说，这种量子点发射作为最原始的射影点已昭然若揭。用来建树量子射影几何，是和自然全息等价的，因此也能回答高也陶医师提出的 QCD “是否可能解决中医的望诊，望气和望色”的问题。这里的基本原理类似射影几何的聚焦透视法；人眼从一点出发，观察实景，从实景的各点出发，通过人眼的光线形成一个投射锥。根据这一原理，量子医学射影几何揭示中医的“望、闻、问、切”的古老的诊断方法，本质类似在含摘人体经络量子点投影的量子意识锥的一些病变“截景”。因为截景样式可以不同，反过来说这些截景就是患者的生命现象，通过外源性 QCD 及 QCD 云流投影锥的一些截面。中医的“望、闻、问、切”类似 QCD 科学家，在大型强子对撞机中寻找、分析上帝希格斯粒子的“截景”一样。

3) 高也陶先生是闻诊专家，出版过《闻诊》一书。他在《医学与哲学》杂志发表的《意识新论》提出量子科学时代的意识概念是：(1)意识可以是，也可以不是大脑的产物；(2)意识可以是，也可以不是生命的产物。这是他思考“闻诊利用了振动波”，而“望诊需要解决光电波”的结果。这和我们认为经络包含量子意识有相似之处。然而这是一个很尖锐的问题。因为即使彭罗斯是世界著名的科学家，他提出的量子意识论和汉姆罗夫的微管论，据说别

人用严格计量方法检验，都还没通过。但用中医的经络来检验量子意识，是一个新方向。

3、这个方向，按萨斯坎德的说法是重新装备头脑。即仅通过经络流阻的测定，发现是低流阻通道是不够的。我们可以把经络对比黑洞、奇点、视界来讨论高也陶的量子意识论。

1) 从人体是一个放大的多维的卡-丘空间，人体生理也联系一些物理、数学规律：生命死亡或细胞凋亡的 QCD 机制与大质量星体一旦核能源耗尽，就没有内部压力能够抗衡引力挤压，即与星体在自身的重力作用下塌缩耗尽其核能源就会塌缩相似。这里虽然对生命死亡或细胞凋亡的 QCD 机制还非常不清楚的，但有一点类似是清楚的：科学家们定义粒子视界，是把所有粒子（包括光子）区分为两类：(1) 那些处在我们视野中的光的波前粒子为一类；(2) 所有其他粒子为另一类。无黑洞粒子视界不同于有黑洞事件视界。在事件视界中，一个球形光波波前向我们汇聚而来，再把所有在每一条测地线上穿过我们的实光子与虚光子，分为两类：(1) 那些在有限时间内到达我们的光子；(2) 有限时间内不能到达我们的光子。

由此联系经络的 QCD 机制，如果说我们的健康是由经络决定的，经络不通是疾病产生的根源，生命死亡或细胞凋亡是 QCD 能源耗尽，那么类似我们的生命物质和意识物质，我们的实践和实验描述，也必须分成或暗含两部分。表现在我们的经络世界，这种机制联系经络量子意识，(1)“宏观人”等价于经络量子意识人，简称经络量子人，它们对应事件视界。(2) 相对的是没有经络量子意识的“微观人”或粒子人。它们的视界称粒子视界。在经络量子意识中，粒子视界也不同于事件视界。

2) 核能源耗尽和 QCD 能源耗尽发生塌缩的论证，物理上暗示着星体的半径必定趋向于零，直到它达到零体积与无限大密度的一个“点”。对于一个黑洞，在  $r < 2Gm/c^2$  的区域，是一个具有巨大密度与张力的引力场的区域。星体大塌缩，有中子星的观察所支持；生命的死亡，有太平间的事实。但这些支持是个令人困惑的实践论和矛盾论。萨斯坎德把它定义为：

**分别把“微观人”（或“点内人”）和“宏观人”（或“点外人”）声称不一致的两个观测，不论结合到哪边脑海景象而得到一个观测事实，这在物理上都是不可能实现的。**

以上定义，我们称为萨斯坎德定律。它是宇宙“大设计”的一个基本定律，能够回答霍金《大设计》书中的一些难题。一些反对相对论者的逻辑，如黄新卫先生说，两个人在一条直线上相对一段距离，各自坐在以光速运动的光子上朝着一个方向运

动,那么他们各自测量对方光子的速度,就不是光速,也许还是0,所以爱因斯坦错了。又如蒋秀夫先生说,光通过各种介质运动,用光的折射率  $n$  转换看光的速度相加原理,洛仑兹变换的速度相加公式与时间流逝快慢毫无关系,所以爱因斯坦错了。黄新卫和蒋秀夫的逻辑表面上看,是对的,但他们都违反了萨斯坎德定律。即黄新卫的能坐在光子上的人,必定是“微观人”或粒子人,爱因斯坦的光速不变原理是“宏观人”的测量。同理,蒋秀夫的光的折射率  $n$ ,虽来自“宏观人”的测量,但能在粒子介质中穿行的必定是“微观人”或粒子人。

3) 在德西特的相对论研究中, $r=R/2$  的视界面,被视为是在空间距离有限上而不可达的时间表面。在史瓦西的相对论研究中, $r=2Gm/c^2$  的视界面,是在有限时间内不可达的与不可穿透的表面。在史瓦西的相对论黑洞概念研究中,有两个奇点: $r=2Gm/c^2$  与  $r=0$ 。由  $r=2Gm/c^2$  代表的奇点,它在物理上能够被解释为一种事件视界而非实在的奇点。由  $r=0$  代表的另一个奇点,是一个真正的奇点,超越了边缘就不存在时空。奇点处的引力如此巨大,如果星体的引力足以强到形成视界,把光拉到里面,这意味着任何黑洞内部都有一个奇点,因为它总是具有一个视界。考虑到极端高的密度与奇点处的小距离,量子效应必定在那里的物理过程中扮演重要的角色,根据霍金与彭罗斯时空奇点,必须用测地线的不完备性的术语来定义:一个无奇点的时空是测地线完备的时空。这实际说的是球面。而球面没有奇点,环面才有。

4) 萨斯坎德定律是由相对论和量子力学及实验证明的:当粒子接近  $r=2Gm/c^2$  时,观察者接收到越来越多的来自粒子的红移光。即粒子在  $t=$  时,粒子穿越视界,一个观察者将永远不能看到粒子达到  $r=2Gm/c^2$ ; 虽然粒子是在有限的原时到达  $r=2Gm/c^2$  或  $r=0$ 。因此,似乎有两个不相容的观点:从外部观察者,即“宏观人”的立场来看,时间将会停滞,而事件在视界中将会冻僵。这似乎暗示着视界不能被看作是物理上真的。这是其一。其二是一个下落的粒子,将会穿越视界不断下落,既注意不到任何时钟的变慢,也看不到在视界上的无限红移。这是从“微观人”或粒子人的立场来看的,视界不会对广义相对论提出任何挑战。

4、以上公式  $r=2Gm/c^2$ ;  $r=0$ , 简直就是我们人的生命物质和意识物质实践或实验的版本。

1) 因为以上的公式中,只要把数学符号  $G$  不看成是引力常数,而看成是量子意识常数,其他符号的意义都不变,对我们人的生命物质和意识物质实践或实验也是成立的。虽然经络量子人视界的意义,对于物理学家是非常不清楚的,但量子意识常数  $G$ ,是有计量的严格值。

2) 因为澄清视界的含义,对于人的生命物质和意识物质,不可能不提及死亡概念及其对应婴儿出生的事件视界。即经络量子人视界的含义,远比任何已经详细研究的定义复杂。例如人的口与肛门相通,类似环面,可抽象为奇点。人体生命对应黑洞,胎儿还在母亲腹中的胎包内,胎包就类似黑洞的视界,胎包球的面积就类似黑洞的面积。黑洞公式  $r=2Gm/c^2$  中的  $r$  如果是黑洞视界的半径,那么类似抽象,就对应胎包球的半径。而且霍金和贝肯斯坦的黑洞熵增原理与面积不减少原理,也是符合经络量子人的熵增原理与视界面积不减少原理的。即胎儿出生或破腹产,婴儿脱离胎包和脐带,经络量子人就从奇点胎儿独自发展,虽然没有了胎包球的形象视界,但可以继续抽象类似的事件视界:由于医生能证明,人在环境中不能脱离进食和吸收信息及知识,这等效熵增原理;由此事件视界面积也不会减少。但在经络量子人死亡,意识停止,事件视界的半径  $r$  从  $r=2Gm/c^2$  大爆炸大塌缩到  $r=0$ 。在这两者之间的生命历程的众多统计权衡中,严格的计量比较也许能得出量子意识常数  $G$  的参考值。

3) 21世纪新弦学不是魔鬼出没的地方,QCD是目前人们知晓的原子、分子、电子、光子等实验和实践的堆垒延伸,它涉及实验中的夸克,是21世纪实验和实践在结构信息上,可探测的最前沿。QCD需要依靠类似的大型强子对撞机提供的实验和实践材料,我国在很长一段时间内也许没有,但这并不妨碍中国掌握经络QCD。如果把人体比作大型强子对撞机,中医师就处在制高点上。中医的QCD望诊、闻诊等手段,作为没有与大型强子对撞机相比的仪器治病的思路来说,也许不失为一种捷径。

## 参考文献

1. [美]里克·坦普尔·贝尔,数学大师---从芝诺到庞加莱,上海科技教育出版社,徐源译,2004年12月;
2. [美]伦纳德·萨斯坎德,黑洞战争,湖南科学技术出版社,李新洲等译,2010年11月;
3. 王德奎,三旋理论初探,四川科学技术出版社,2002年5月;
4. 孔少峰、王德奎,求衡论---庞加莱猜想应用,四川科学技术出版社,2007年9月;
5. 王德奎,解读《时间简史》,天津古籍出版社,2003年9月;
6. 刘月生、王德奎等,“信息范型与观控相对界”研究专集,河池学院学报2008年增刊第一期,2008年5月;

7. 叶眺新, 中国气功思维学, 延边大学出版社, 1990年5月;
8. 王德奎, 从卡 -- 丘空间到轨形拓扑, 凉山大学学报, 2003年第1期;
9. 叶眺新, 自然全息律, 潜科学, 1982年第3期。

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## A New Perspective on Extinctions: The Search for a Common Formula.

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**Abstract:** This paper introduces a new theory to explain and to estimate the size and frequency of extinctions over the entire period of 600 my of the fossil record. The current explanation is excellent. There seems to be a common pattern or formula. We will demonstrate in what way death is a fact of life: there is a constant margin of 10 pct, and about seven peaks with at least 25 pct of extinction victims. Those peaks occur each 85 million years, but their frequency has increased over time. In principle, the predictability of the next peak is limited, because of chaos (within the solar system and the ecosystem on Earth), the unpredictability of mutations in Nature, of innovations by Man, and let alone the disastrous impacts of asteroids. It also depends on the concept of whether life is cyclical or linear. Therefore, some predictions have a low likelihood of occurrence. In the traditional theory or Old Vision there are many extinctions and even mass extinctions, each with various theories believed to be their cause. There is no single theory explaining all extinctions. Man was witness to and perhaps later on even guilty of extinctions. Even as early as in the Ice Ages he tried to find facts and continued later on in the Age of Science. But we still do not see extinctions in their right perspective, and it would be very useful to change this.

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**Keywords:** Perspective; Extinction; Formula

### 1. Introduction:

**A New Perspective.** We may say that there are many factors behind the increases and decreases of the number of species. We will try to bring them together in a simple diagram; see figure 1. The main causes are as follows:

1. Chaos in the solar system and changes in the position of the axis of the Globe, both causing changes in the radiation on the surface of Earth,
2. Climate,
3. Volcanism,
4. Tectonics, with changes of the surface of the Earth,
5. Impacts (I) of asteroids, with often catastrophic effects.

All the above five factors are in a very complicated relationship.

We see the influence of many factors on extinctions (L) and on the number of species (N), or on the numbers of mutations (M).

Mutation (M) does increase the number of species (N). Increasing the number of species leads to more competition and, as a consequence, some species will become extinct. This is called extinction by natural selection.

Mutation also plays a very different role in

the growth process of an ecosystem and subsequently on extinctions. If there are sufficient mutations the growth is stable; see figure 2. What is established is similar to a Ecological Hierarchy, with the highest developed species of the particular period placed on top.

If the mutations fall back something remarkable happens: the Hierarchy deteriorates, especially from the top; see figure 3. The highest developed species disappear forever, and show a special form of extinction (Noort, 1995). This idea was based on the Chaos Theory, in the early nineties not yet accepted as a useful theory like it is today (Bennett, 2010).

If we look at the diagram closely. The relations at the "bottom" of the scheme appears not that complicated - we could say:

$$L = f(N, M, I).$$

This model leads to a simple equation for testing purposes:

$$L = aN + bM + cI + u$$

in which 'u' is a statistical rest term.

There are some variations on this formula by using dM instead of M and a case of interaction between Impact and Mutation. If Earth is far from

the sun, it is close to the asteroid belt. Thus, L could increase by impacts, but the radiation of the sun there is also lower and causes fewer mutations, which may also increase L. The two factors then act together, and we could regard this as an interaction by using the third term (dM.I) instead of I alone. In total we have six possible equations. *It is remarkable that for Evolution we could not formulate such a simple equation because it has not the "at the end of the line"-position as Extinction has. in figure.1.*

2. Falsification, The case of foraminifers. Because we have statistical facts about L, N, M, and I we could test the hypothesis; however it is beneficial to commence with an illustration by words only, and for only one species.

We use the foraminifers in Egypt as an example. There were two species: *Gumbelitra cretacea* A and B. In the situation of figure 2 we notice that type A is a rather marginal animal, therefore positioned at the bottom of the Hierarchy. The larger, more productive type B has just about reached its position at the top. The difference between the two is related to mutations M and with the journey of A and B along the side of the Ecological Hierarchy - this is natural selection; the struggle between species (N).

Subsequently, a change in conditions occurred (see figure 3) and the mutations fell back. As a consequence (from Chaos-Theory) the more dominant variant has moved down the Hierarchy, but nothing happened to the marginal types. What we see here is similar to a revolution: the highest fell down and the lowest remained in position. We know that 65 my ago, considerable damage to the fauna occurred due to the impact of an asteroid (I). What might we expect to find after such an occurrence? Below the boundary we should see type A and B - and B is dominating. Above the boundary we will see only type A; B must have disappeared, become extinct. Further on, there must be radioactive iridium from the impact. In fact we see all this indeed in the Sinai area. (Elewa and Dakrory, 2008)

So we applied our concept and found no contradictions to the facts. However, this is of course just one case, therefore we continue with the general case to explain all extinctions.

3. The general case: statistical tests. We have seen that there are various hypotheses. Yet how can we discriminate amongst them? The philosopher Karl Popper proved that the only direction to take was falsification. Very good

possibilities were e.g. regression and correlation analysis or tests.

The tests are all based on statistical data. We will test our six linear regressions-equations. The test must provide answers, e.g.: do the coefficients a, b, and c have the right sign and are they statistically different from zero; and also whether the correlation coefficient is high enough to justify an explanatory case?

The results of statistical testing are in table 1. Each of the six columns is such a regression -equation with an estimate of the regression coefficients and their standard error, between ( ).

In order to be statistically significant the coefficient must at least be two times larger than the error, according to the wellknown t-test. This is indeed the case for all equations, and in addition they have the expected sign.

The measure of explanation is R square; providing the percentages of explanation. The measure of relationship is given by the correlation coefficient. This one is high, given the degrees of freedom.

The statistical table 2 indicates a high interpretive character of the presented model of extinctions.

#### Conclusion:

The presented idea of a general explanation is not in contradiction with facts, because the coefficients have the expected sign and differ statistically from zero indeed. The correlation coefficient is high. Therefore we can justify a statistically acceptable relationship, based on the process of falsification.

#### 4. Forward and Backward predictions.

The statistical formula can now be used for estimating the size of extinctions over the whole period of 600 million years, see figure 4. These estimates can be named backward predictions.

We see that there is no basis for the concept that the number of species did not change over time (Jacobs, 2002), because there is a continuous margin of extinctions (about 10 pct) and 7 peaks of at least 25 pct. of victims.

The frequency of the Peaks was, on average, one in 85 million years, but the frequency increased gradually over time. The longer the period between peaks (t), the more families and

species may grow, or in other words: the longer that period, the more victims ( $v$ ) may be expected by the end of the period and vice versa. Based on figure 4 we have found a weak relationship between  $v$  and  $t$ :

$$v = 3.01 + 0.13t$$

In table form and real scales:

my	.....v =22pct	t=0
my	.....v=31pct	t=45
my	.....v=40pct	t=90

One of the persistent problems in the evolutionary theory consists of the missing links. People have an idea of a continuous trend in evolution, with *Homo sapiens* at the top. As a consequence they are unsuccessfully looking for the links between the successive dominant types. Even Darwin made that point, yet he should not have been so concerned. At the end of a period the Ecological Hierarchy caves in and many dominant species disappear forever, the marginal types take their places and some of them become the dominant types in the following period. So there is no special link between the successive dominants, and this holds true for all peaks. We see that there is not only evolution, but also revolution. Revolution prevents any link between the dominant types of the various periods; this is also found during many types of research. Missing links of this type form additional proof for our theory.

It is also repeated continuously that the strongest always wins in evolution (Jacobs, 2002). This is not true. The productive type is the winner of each period between two peaks. It is the type with the highest growth coefficient ( $k$ ) that will belong to the top region of the Hierarchy. Furthermore it is clear that the dominants do not live forever as a species; no one survived up to these days; not even the Methusalae (a term introduced by Ward for species like stromatolites), living almost without competition (see figures 2 and 3, with  $w=0$ ). There is no continuous line for the History of Life, but only an upward tendency through a 'zigzag line'.

There are now two forward predictions of the next peak:

1. Ward estimated an imminent extinction which will bring life to a halt. He implicitly sees life as linear, see  $W$  in figure 4
2. Noort predicted by extrapolation of the found statistical relationship, using the expected number of years for a peak to occur. This is now somewhat less than 85 years (say 60 my) and the peak may either be somewhat higher than the lowest up to now, or somewhat lower than the highest up to now. See  $N1$  and  $N2$  in figure 4. A good 'guestimate' is the average of both. Therefore, in about 60 my after peak number 11 we could have the next one with about 35% of victims. Life here is considered cyclical: life changes all the time, but it does not disappear forever.

The difference between the two estimates is considerable. For  $W$  we have the shortest period ever and also the highest 'victims rate'. It is possible that the period is much shorter than for its 'rival estimate' and also that its victims rate is much higher, but the likelihood of occurrence is then lower as well.

The constant margin of 10% seems to be an average of all the periods in this frame; and the peaks ( $v$ ) become higher as the period ( $t$ ) becomes longer than the average. A short period with a high victims rate does not appear to have a very high likelihood of occurrence.

### Conclusion:

It is possible to see all extinctions in one perspective and to falsify the many hypotheses. In principle the equations can also be used for predictions, the backward predictions are excellent, but the forward predictions have strong natural limitations. Time and size of the next extinction is not possible to estimate, the impressive prediction by  $W$  has a lower likelihood of occurrence than the guestimate  $N$ .



Figure 1 Diagram of causes and effects on extinction

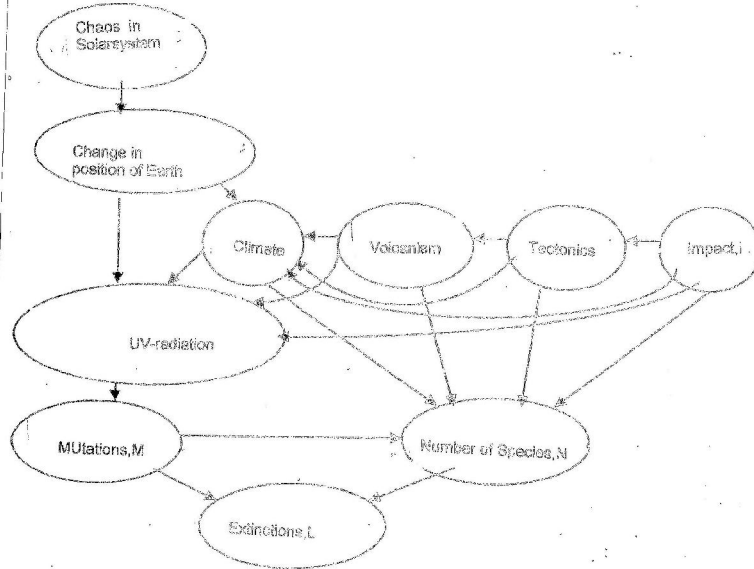


Fig. 1

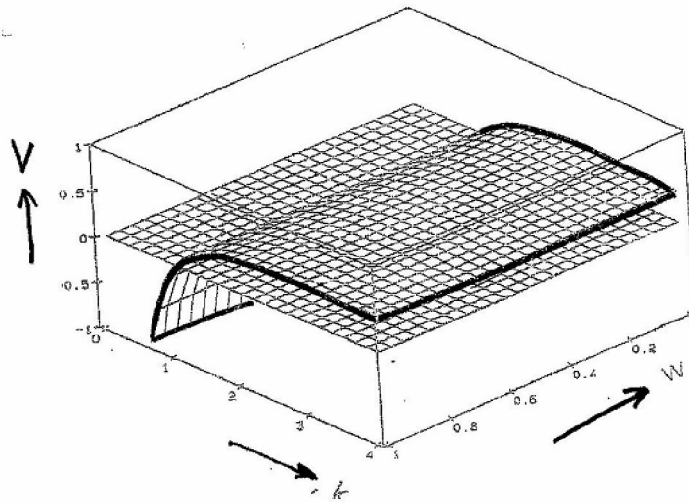


Figure 2 The Stable Ecological Hierarchy in case of increasing mutations

V=vitality, k= coefficient of growth, w=degree of competition  
 w=0=monopoly, w=1=pure competition, (Noort, 1995).

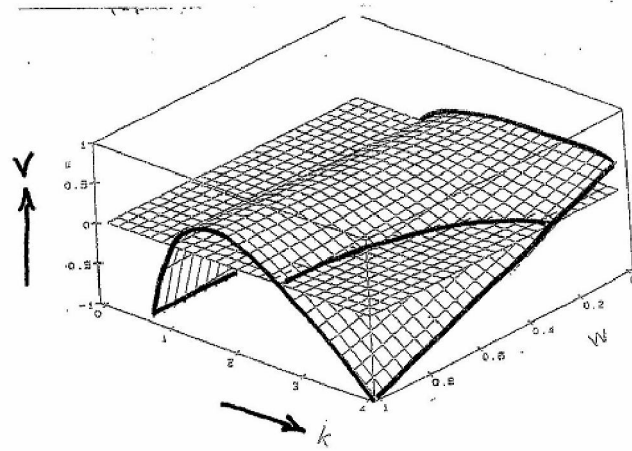
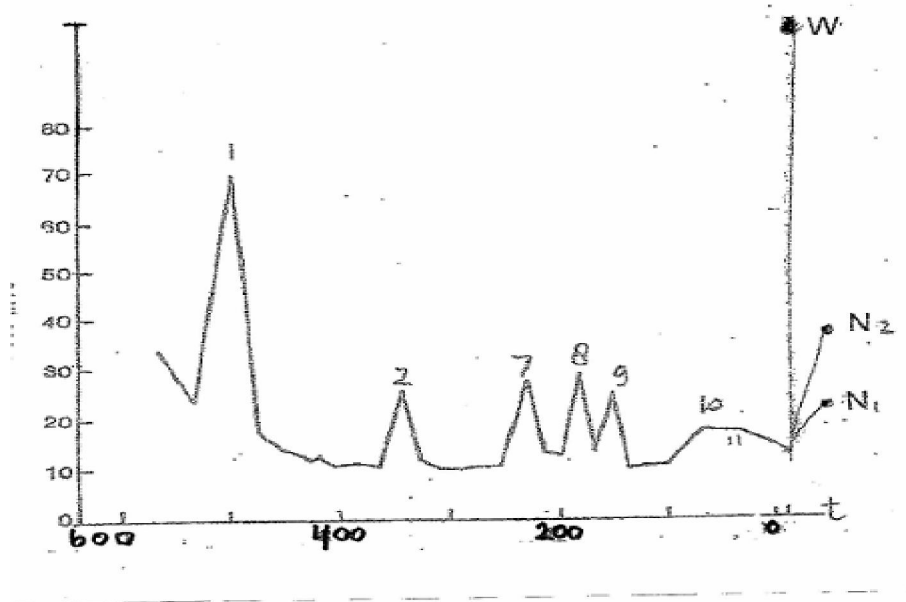


Figure 3 The unstable Ecological Hierarchy, in case of decreasing number of mutations, (Noort, 1995)



1=Cambrian, 2=Devonian, 7=Permian, 8=Triassic, 9=Jurassic  
 10= Cretaceous, 11= Palaeocene; Mass Extinctions

Figure 4 Estimates of extinctions in the last 600 my and two predictions of the next mass extinction.

Table 1 Statistical results.

Equation:	(1)	(1a)	(2)	(2a)	(3)	(3a)
Variable.						
<i>N</i>	0.076 (0.035)	0.057 (0.054)	0.079 (0.036)	0.230 (0.057)	0.184 (0.049)	0.220 (0.044)
<i>M</i>	0.120 (0.073)	0.071 (0.148)				
$\Delta M$			0.043 (1.23)			
$\Delta M^a$				0.427 (0.185)	0.433 (0.149)	-0.166 (0.283)
<i>I</i>	53.74 (13.89)	47.36 (19.54)	53.03 (14.84)		40.31 (14.26)	62.14 (15.25)
$\Delta MI$						0.763 (0.322)
<i>MI</i>		0.021 (0.191)				
R-square	0.59	0.57	0.60	0.56	0.74	0.83
Degrees of freedom	24	24	23	13	12	11

<sup>a)</sup> $\Delta M < 0$  only

Table 1 Table of statistical results : six equations,their coefficients,the standard errors and correlation coefficients.  
The t-test requires that the coefficients are at least 2 x their standard errors.

R	Rsquare	% explained	Interpretive power
<0.3	<0.1	<10	very weak
0.3 -0.5	0.1 - 0.25	10 - 25	weak
0.5 -0.7	0.25 - 0.5	25 - 50	rather weak
0.7 - 0.85	0.5 - 0.75	50 - 75	strong
0.85 - 0.95	0.75- 0.9	75 - 80	very strong

-----Our first estimate in the first column of table 4 was Rsquare =0.59 ,So this table says: strong relationship!  
We may also speak of statistical significance.

Table 3.

**Appendix 1** First and last known occurrences of main animal groups

Series	Duration (million years)	Total fam- ilies	First occurrence		Last occurrence	
			Fam- ilies in per cent	Fam- ilies per million years	Fam- ilies in per cent	Fam- ilies per million years
Neogene	32.5	856	17	.52	10	.30
Palaeogene	32.5	834	44	1.35	15	.46
Upper Cretaceous	35.0	629	26	.74	26	.74
Lower Cretaceous	35.0	520	35	1.00	11	.31
Upper Jurassic	15	377	15	1.00	11	.73
Middle Jurassic	15	346	14	.93	7	.47
Lower Jurassic	15	328	50	3.33	10	.66
Upper Triassic	16.6	278	19	1.14	35	2.11
Middle Triassic	16.6	254	25	1.50	10	.60
Lower Triassic	16.6	235	36	2.17	18	1.08
Upper Permian	25.0	303	21	.84	50	2.00
Lower Permian	25.0	330	15	.60	27	1.08
Upper Pennsylvanian	10.0	315	11	1.10	11	1.10
Middle Pennsylvanian	10.0	318	5	.50	5	.50
Lower Pennsylvanian	10.0	308	6	.60	3	.30
Upper Mississippian	17.5	318	8	.46	9	.51
Lower Mississippian	17.5	315	28	1.60	7	.40
Upper Devonian	20.0	327	14	.70	30	1.50
Middle Devonian	20.0	326	15	.75	13	.65
Lower Devonian	20.0	298	21	1.05	7	.35
Upper Silurian	6.6	272	8	1.21	13	1.96
Middle Silurian	6.6	265	13	1.96	5	.75
Lower Silurian	6.6	243	28	4.24	5	.75
Upper Ordovician	25.0	228	10	.40	24	.96
Middle Ordovician	25.0	221	33	1.32	7	.28
Lower Ordovician	25.0	192	76	3.04	23	.92
Upper Cambrian	33.3	97	34	1.02	52	1.56
Middle Cambrian	33.3	82	50	1.50	22	.66
Lower Cambrian	33.3	55	100	3.00	25	.75

Table 4.

Geo Scale		A Correlated History of Earth				Bio Scale
[ GEOLOGICAL COLUMNS ]			[ BIOLOGICAL COLUMNS ]			
Tectonics: (Maps, 1 Events...)	Stratigraphy: (Era, Period...)	Classics and 1 Astroblemes age	Plants, Fungi: Prokaryotes, Protocista	Invertebrates Animals	Vertebrates Animals	
	Quaternary	2				
	Tertiary		⊙	⊙	⊙	
	Cretaceous		⊙		⊙	⊙
		141				
	Jurassic	202	⊙	⊙	⊙	
	Triassic	230	⊙	⊙	⊙	
	Permian		⊙	⊙	⊙	⊙
		260				
	Carbonif.		⊙	⊙	⊙	⊙
		263				
	Devonian	300	⊙	⊙	⊙	
	Silurian	330	⊙	⊙	⊙	
	Ordovician	310	⊙	⊙	⊙	
	Cambrian	344				
Geo Key	Proterozoic Eon 2500	Astro Key		Bio Key	(C)	
	Archean Eon 4500	Classi Key				

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**References**

- Bennett, K; The Chaos-theory of Evolution, New Scientist, Oct. 2010
- Chaloner, W.G. and Hallam, A.; Evolution and Extinction, Cambridge, 1989
- Darwin, Charles; Het ontstaan van soorten, 2009 Elewa A.M.T. (ed.): Mass Extinction. Springer-Verlag Publishers, Heidelberg.
- Jacobs, G; De sterksten zullen overleven, Amsterdam,2002.
- Morris, Ian; The Western Science Conquered the World, New Scientist, October 2010
- Newell, N.D.(1967); Revolutions in the History of Life, Geol.Soc. of America, Special Paper,
- Noort, P.C. van den; Complexity and Survival, Eburon, Delft, 1995
- Noort, P.C. van den; Evolution, Mass-extinction and the Chaotics in the Solar System, in: Speculations in Science and Technology, Vol. 17.1995
- Noort, P.C.van den; Soortenrijkdom op de zeer lange termijn, Doorwerth, 2010
- Pleitgen, H.O. & Richter, P.H. The Beauty of Fractals, Berlin,1986.
- Ward, P.; De aarde neemt wraak, Scientific American no.1, 2007
- Willers, M.; The Bedside Book of Algebra, ISBN 978-90-8998

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## 对江棋生先生批李杨时间和空间反演“失足”异议

叶眺新

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Abstract: 读懂江棋生先生对称性破缺起源机制的理解,就涉及负数“无”和虚数“无”,或整体和撕裂的对称性及对称性自发破缺。这和 1957 年李政道和杨振宁获诺奖打破的弱宇称守恒定律有关。因为我们可以从庞加莱猜想和点内空间的联系想到这一点。现代物理学理论认为,微观高能物理实验反应可同时产生同等数量的粒子与反粒子,粒子与反粒子在质量等方面相同,但在电荷等方面相反,两者相遇便会湮灭同时释放出能量。但这都是从“点外空间”的具体科学实践得出的结论,是正确的。但如果是在 100 多亿年前的宇宙大爆炸,那是从“点内空间”的虚、实数的非对易反应,延拓到“点外空间”的虚、实数的非对易反应,实际情况就并非应是同时产生同等数量的粒子与反粒子。所以科学家并未在现今宇宙中,找到与大量物质等量的反物质。我们现以宇称不守恒理论为例,联系三旋/弦/圈理论,试探看还有什么新发展和发现?宇称是表征粒子或粒子组成的系统在空间反射下变换性质的物理量,在空间反射变换下,粒子的场量只改变一个相因子,这相因子就称为该粒子的宇称;这可以简单地理解为,宇称就是粒子照镜子时,镜子里的影像。

对江棋生先生批李杨时间和空间反演“失足”异议. Academia Arena, 2011;3(4):19-22] (ISSN 1553-992X). <http://www.sciencepub.net>.

**Keywords:** 江棋生; 李杨; 时间; 空间; 反演

李杨认识时间和空间反演失足吗?江棋生先生批李杨,说他们在“时间和空间反演失足”。读懂江棋生先生对称性破缺起源机制的理解,就涉及负数“无”和虚数“无”,或整体和撕裂的对称性及对称性自发破缺。这和 1957 年李政道和杨振宁获诺奖打破的弱宇称守恒定律有关。因为我们可以从庞加莱猜想和点内空间的联系想到这一点。现代物理学理论认为,微观高能物理实验反应可同时产生同等数量的粒子与反粒子,粒子与反粒子在质量等方面相同,但在电荷等方面相反,两者相遇便会湮灭同时释放出能量。但这都是从“点外空间”的具体科学实践得出的结论,是正确的。但如果是在 100 多亿年前的宇宙大爆炸,那是从“点内空间”的虚、实数的非对易反应,延拓到“点外空间”的虚、实数的非对易反应,实际情况就并非应是同时产生同等数量的粒子与反粒子。所以科学家并未在现今宇宙中,找到与大量物质等量的反物质。我们现以宇称不守恒理论为例,联系三旋/弦/圈理论,试探看还有什么新发展和发现?宇称是表征粒子或粒子组成的系统在空间反射下变换性质的物理量,在空间反射变换下,粒子的场量只改变一个相因子,这相因子就称为该粒子的宇称;这可以简单地理解为,宇称就是粒子照镜子时,镜子里的影像。如果把镜子里的影像,类比为是在一种“点内空间”。那么从微观粒子到点内空间,正是三旋/弦/圈理论试探虚数相因子联系的对象。根据

对称性,物理界以前公认宇称一定是守恒的,这就像有正电子,就一定有负电子一样。即相对“点内空间”,镜子外的实物,相当于“点外空间”。1956 年杨振宁与李政道教授共同提出“弱相互作用中宇称不守恒”定律,相当于研究“点内空间”与“点外空间”微观粒子之间的互换。对称性反映了“点内空间”或“点外空间”不同物质形态在运动中的共性,而对称性的破坏才使得“点内空间”和“点外空间”显示出各自的特性。大自然同时是“点内空间”和“点外空间”的建筑师,对称性的破坏,显示了确定性与不确定性、克隆与不可克隆的辩证统一,而使大自然变得丰富多彩、神奇难解。小孔成像与点内空间宇称守恒原理在宇称不守恒原理没有发现之前,由于只是对大量物质实验的总结归纳,没有经过“点内空间”与“点外空间”之间粒子互换的严密的数学证明,就作为定律推出来的,在形式逻辑上也只能算是一种假说。即使是宇称不守恒原理的这种镜像对称的数学证明,从形式本体论上说,也只能算是一种平面镜成像原理的类比。这种平面镜成的像大小与实物相等,左右与实物相反,是一种虚像。而且宇称不守恒联系平面镜成像、凸透镜成像和小孔成像分析,还可能存在丰富多彩的复杂性。例如小孔成的像,大小可以与实物不相等,但左右与实物就不会有颠倒,即宇称不守恒的数学证明没有把小孔成像原理类比包括进去。其次,平面镜成的像类似深入镜内空间,但这种距

离是虚的。小孔成像照相机和凸透镜成像照相机，像由实际光线汇聚形成，深入到照相机内部空间。如果把这也类比点内空间的数学抽象，那么这种点内空间的对称和平面镜成像相比，即使大小对称不等、倒立对称不等不计，但倒立对称类似翻转了180度，已改变了平面镜成像对称的左右与实物相反的对称，为左右与实物没有颠倒。即你举左手，宇称平面镜里你举右手，但宇称小孔成像照相机里边，你的右手居然不举，左边成为“错误”地举起手。把这种数学原理对应推证为“宇称不守恒”，是否也是一种点内空间造成的不守恒呢？宇称不守恒性物理理论被实验证实后，并没有再给予深层次的数学原理的总结证明，这正是现代形式本体论开拓提出点内空间、曲线等数学概念及其物理假说等的原因。但形式本体论不等于科学假说，而是在科学假说的基础上，推进实验生产、形式逻辑、分析哲学等深化的一种科学研究方法。因为一个深层次的科学实验或原理，不经过形式本体论的证明，可能都是不完善的。点内空间与李杨之争李杨之争，类似争谁先想到“点内空间”与“点外空间”这种不对称的。李政道虽然说宇称不守恒思想的突破，是他独立地做出与杨振宁无关，但李政道也承认，演变求衡可以是多方向进行的。在二十世纪的中叶，粒子物理为什么被认为是物理学中精华的精华，其原因是，除粒子物理学问的最高层次，在数学物理中所有不同名称的物理，都是同一个物理；而真正物理学家研究的目的，就是要把所有形形色色，似乎不相关的自然现象都归纳成同一组基础原理，都能融会贯通，这时粒子物理就是这种物理之精华。当时的情况是这样：1954、55年， $\pi^-$ 之谜已成为物理学界关注的焦点。此时的 $\pi^-$ 之指，50年代初从宇宙线里观察到两种新的粒子， $\pi^+$ 和 $\pi^0$ 。它们具有很不同的衰变（点内空间）模式。

衰变为两个介子， $\pi^0$ 衰变为三个介子。因为奇数个介子的总宇称是负的，而偶数个介子的总宇称是正的。所以从 $\pi^+$ 和 $\pi^0$ 的衰变模式可以决定 $\pi^+$ 的宇称是正的（称为标量），而 $\pi^0$ 的宇称是负的（称为赝标量）。奇怪的是到1954、55年，经过很精密的实验测量，发现在实验的精确度内 $\pi^+$ 和 $\pi^0$ 这两个不同宇称的粒子居然有完全一样的寿命和质量。那时候，从 $\pi^+$ 、 $\pi^0$ 的衰变模式，不仅可以决定它们二者的宇称不同，也已知道这类的衰变是通过弱作用力实现的，因而可用理论计算来估计它们的寿命。假使 $\pi^+$ 和 $\pi^0$ 是不同的粒子， $\pi^+$ 的寿命应该比 $\pi^0$ 的寿命长很多，约一百倍。可是实验结果是 $\pi^+$ 和 $\pi^0$ 的寿命几乎完全一样。而且，假使 $\pi^+$ 和 $\pi^0$ 是不同的粒子，为什么它们的质量也会几乎完全一样呢？如果认为它们是同一个粒子，它们怎么会具有完全不一样的宇称呢？为解决这一问题，物理学界曾提

出过各种不同的想法，但都没有成功。在1956年4月3-7日的罗彻斯特会议上，包括李政道和杨振宁，已经有人提出是否在 $\pi^+$ 和 $\pi^0$ 的衰变中，宇称可能不守恒。但是，会议上的这些讨论都没有达到任何结论。原因是，当时宇称守恒问题，基础是“左右对称”，而“左右对称”一向被认为是物理的公理。从经典物理学开始到近代物理学（包括力学、电磁学、引力场、弱作用理论、原子、分子和核子构造等），一切的物理理论，在1956年4月以前，都是左右对称的。因为每一门物理理论都有一大批、一大批的实验作证明，所以物理学家们想当然地认为左右对称在粒子物理学中也被充分证明了，是非常正确的，是自然界的真理。宇称守恒是天经地义的。所有的物理学家都公认，一切已了解的物理都是左右对称的，是宇称守恒的。这是毋庸讨论的。问题是：在当时一切已了解的物理之外， $\pi^-$ 衰变宇称不守恒，是否可作为一个特殊例外，是孤立的一点。假使 $\pi^-$ 和 $\pi^0$ 是同一个粒子，在它衰变过程中，宇称并不守恒，那会产生什么结果呢？那结果就是，这同一个（即 $\pi^-$ ）粒子既可以按宇称为正的 $\pi^+$ 模式衰变，也可以按宇称为负的 $\pi^0$ 模式衰变。可是这个结果与从一开始就已经知道的 $\pi^-$ 之谜的现象完全相同。因此，虽然提出了 $\pi^-$ 衰变宇称可能不守恒的假设，可是这种假设不产生任何新的物理结果。这种假设与一切其他物理无关。在这种假设提出以前， $\pi^-$ 之谜是孤立的一点；做了这种假设以后， $\pi^-$ 仍然还是孤立的一点。因为这种假设并不能产生任何新结论，所以这种假设就不能看做是宇称不守恒思想的突破。这一点物理学界是公认的。1956年4月8日或9日，李政道忽生灵感，突然很清楚地明了要解决 $\pi^-$ 之谜，必须先离开 $\pi^-$ 系统，必须假定 $\pi^-$ 以外的粒子也可能发生宇称不守恒的新现象。而重粒子实验中产生和衰变的几个动量，便能很简单地去组织一个新的赝标量。用了这 $\pi^-$ 以外的赝标量，就可以试验 $\pi^-$ 以外的系统宇称是否不守恒。而这些赝标量，很显然的没有被以前任何实验测量过。用了这些新的赝标量就可以系统地去研究宇称是否不守恒那个大问题。 $\pi^-$ 之谜不再是一个孤立的点，它可以和重粒子实验的重粒子连起来，也可能和其他一切物理整体地连起来。要解开 $\pi^-$ 之谜，就要去测量弱作用中 $\pi^-$ 以外的赝标量。李政道猜想，宇称不守恒很可能就是一个普遍性的基础科学原理，这就是宇称不守恒思想的突破。但当时，已经有实验工作的原始实验数据，可是因为不知道应该如何去分析，所以还没有将这些数据放在一起分析。而且认真去分析，虽然有迹象显示出宇称不守恒，但因数据不够，不能得出定论。例如，重粒子 $\pi^0$ 的衰变，从 $\pi^0 \rightarrow \pi^+ \pi^-$ 到 $\pi^0 \rightarrow \pi^+ \pi^- \pi^0$ 有7个事例，从 $\pi^0 \rightarrow \pi^+ \pi^-$ 到 $\pi^0 \rightarrow \pi^+ \pi^- \pi^0$ 却



有 15 个事例，多了约一倍。重粒子  $\Lambda$  的衰变，从  $J=0$  到  $J=1$  有 13 个事例，从  $J=1$  到  $J=2$  只有 3 个事例，小了约四倍。这个初步的宇称不守恒的实验，已充分证明宇称是否守恒的问题不再停留在  $J=1$  之谜的孤立一点。 $J=1$  以外的不稳定重粒子  $\Lambda$  和  $\Sigma$  也都被包括进来了！当然，弱作用衰变，除了奇异粒子外，还有更大的领域，那就是有五十多年研究历史的  $\beta$  衰变。这包括中子、 $\pi$  介子、 $\mu$  子等更多的粒子。1956 年 5 月初，李政道和杨振宁合作讨论重粒子实验测量的“二面角”，李政道写下方程式，画了图，向杨振宁作解释，重粒子实验分析中用的角度  $\theta$ ，不是杨振宁想象的二面角，而是指他的新赝标量。二面角是标量，只能从  $0$  到  $\pi$ ，当然是宇称守恒的。这新的  $\theta$  角度是赝标量，可以从  $0$  到  $\pi$ ，然后也可以从  $\pi$  到  $2\pi$ 。比方说，当  $\theta$  在  $0$  到  $\pi$  的区域时类似在“点外空间”，和  $\theta$  二面角一样；在  $\pi$  到  $2\pi$  的区域时类似在“点内空间”，就完全不一样。用了点内空间这样新的赝标量  $\theta$ ，通过  $\Lambda$  和  $\Sigma$  的衰变过程，如果这二个区域的事例数不同，那就是明确的点内空间和点外空间（宇称）不守恒的证明，据此就可以去测量  $J=1$  以外的粒子是否也是点内空间和点外空间（宇称）不守恒。

2. 杨振宁也是一位优秀的物理学家，他们的合作发表的宇称不守恒的文章，改变了整个物理学界以前在点内空间和点外空间“对称”观念上的一切传统的、根深蒂固的、错误的、盲目的陈旧见解！在 1956 年以前，从经典物理到近代物理，都是点外空间对称的物理。那时候的物理学（电磁场、相对论、量子力学等等）都被禁闭在点内空间和点外空间（宇称）“守恒”这个似乎是天经地义的定理的堡垒内；堡垒外没有任何物理。1956 年以后，大部分的物理现象都发现有不对称。不仅类似点内空间和点外空间的宇称不守恒和左右不对称，电荷的正负也不对称，时间反演也不对称，真空也不对称，因而夸克可被禁闭，不同的中微子间可以互相转换变化，连质子也可能不稳定...。证明类似点内空间和点外空间弱作用宇称不守恒的决定性的实验，是吴健雄和她的合作者在 1957 年 1 月完成的。因为如果类似点内空间和点外空间的  $J=1$  宇称不守恒，那么这种破坏在极化核的  $\beta$  衰变的点内空间和点外空间分布中也应该观察到；如果去测量赝标量，这里  $p$  是电子的动量， $\sigma$  是核的自旋。

$$- + p \quad - + p$$

$$0 + 0 \quad (1) \quad 0 \quad - + p$$

(2) 李政道和杨振宁合作讨论集中在  $J=1$  之谜上面。杨振宁想到了，应该把产生过程的对称性同衰变过程分离开来。例如，假设宇称只在强作用中守恒，在弱作用中则不然，那么， $\Lambda$  和  $\Sigma$  是同一粒子且自旋、宇称为  $0$  的结论就不会遇到困难。这种分离对反应链 (1) (2) 有特别的意义。因为这种想

法可以通过 (1) (2) 两个反应中可能存在的上下不对称性而加以检验，它就更有吸引力了。把  $\Lambda$  和  $\Sigma$  的产生和衰变数据从  $J=0$  到  $J=2$  进行划分的分析，可行性必须做  $\beta$  衰变领域的分析，才可以决定。1950 年杨振宁和蒂欧姆诺研究的  $C$  和  $C'$  这两种耦合常数，是不能同时用的。而到 1956 年李政道和杨振宁研究宇称不守恒，已演变成的  $C$  和  $C'$  可以同时用。有了点内空间和点外空间不守恒的观念，如果把“同位旋”比作类圈体的线旋，再类似自然全息，联系点内空间和点外空间的自旋，从质子和中子也能知道：如果整体的同位旋是守恒的话，质子和中子的质量必须相等；可是事实上中子比质子重，中子能衰变成质子加电子和中微子，这就是  $\beta$  衰变，因此也能知道整体的同位旋是不守恒的。因为整体是所有局部之和，所以局部的同位旋也一定不守恒，因而同位旋的规范一定可变。但规范场的观念起源于电磁场，电子数（也就是电荷）的守恒产生了电子数规范不变性，而电子数的规范场就是大家熟悉的电磁场，1954 年杨振宁和密尔斯的《同位旋守恒和同位旋规范不变性》文章，同位旋也还守恒。所以如果点内空间和点外空间不守恒也可以演变成同位旋不守恒，同位旋规范也是绝对能变的。即从同位旋守恒和同位旋规范不变性出发，也可以演变成重粒子守恒和普适规范的转换。因此，1954 年的杨 - 密尔斯规范场方程式，不能用在同位旋上，但是 20 年后可以演变成用在夸克间的色动力学作用上，是完全准确的。宇称不守恒不仅开拓了物理学“点内空间和点外空间”的一个新大陆，也震动了整个物理学界。使人们去重新检查所有以前认为已经了解的物理，尤其是它们的对称性的理论基础；而无数“点内空间和点外空间”新的理论问题需要解决，更多的新的实验观察也需要分析。这一切像潮水似的一个浪、一个浪地冲击过来。

### 参考文献

- [1] 杨本洛，自然科学体系梳理，上海交通大学出版社，2005 年 1 月；
- [2] [美] 卡尔·萨巴，黎曼博士的零点，上海教育出版社，汪晓勤等译，2006 年 5 月；
- [3] [英] R.L. 普瓦德万，四维旅行，湖南科学技术出版社，胡凯衡等译，2005 年 10 月；
- [4] 王德奎，三旋理论初探，四川科学技术出版社，2002 年 5 月；
- [5] 于敏，宇称守恒定律是怎样被动摇的，人民日报，1957 年 2 月 23 日；
- [6] 薛晓舟，量子真空物理导引，科学出版社，2005 年 8 月；
- [7] [美] 霍根，科学的终结，孙雍君等译，远方出版社，1997 年 10 月；5 日；

[8]孔少峰、王德奎，求衡论---庞加莱猜想应用，  
四川科学技术出版社，2007年10月.

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## The role of micro-credit in improving agricultural development

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**Abstract:** Rural women are among those major groups at society who previously were considered less by planners, due to specific reasons in the past. And this problem is more observable at developing countries. While, by looking at women's history of economic and social life, we can find that this great group, continuously have played basic role in forming economic condition of country. This great group consistent with men have had active role at areas of social-economic activities and always have had major part on economic production of society. Nowadays, supporting family supervisor women is adopted by universal society, as politic, economic a social concern and nearly all countries applied related approaches, and however these efforts have resulted in failure, in so many cases .

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**Keywords:** micro-credit, in improving agricultural development

### Introduction:

If rural women can work through receiving credits , loan and others finance facilities at favorite jobs and live through earned income (as it called "self-reliance and independence") , so undoubtedly we would see changes in social, economic and cultural relations of village.

Here, Basic issue is that if changes happened following of these events in villages, have positive aspects or negative? Naturally, every change in institutions and social phenomena has both positive and negative dimensions. (Farghdan, 2001)

Being high and low of each one is depended on various conditions and terms so it is varied from one society to another society. In Iranian rural societies, cultural and social context is such that, consequences of these phenomena maybe being different and sometimes contradictory. However these actions caused that women stand in good economic condition and also gain self reliance and rely themselves with no help from husbands, but dominant cultural space on villages may create some disorders. At most of villages in Iran, patriarchal with all features dominate and women's financial self reliance may not being pleasant for some human and rural groups. When women gain financial independence in villages, impacts and social and cultural consequences would emerge. (Chabokru and etal, 2005)

Increasing Suffrage, lack of relying on vast patriarchal families, increasing cultural acknowledgment, relation with newer institutions, having intellectual independence, making decision for marrying, occupation, emigration and etc are those rights that they gain. gaining aforementioned rights by

women in context of cultural and social framework followed some changes that maybe lead to disfunctions and even create disorders and abnormalities at traditional , familial and kinship relations that dominated on villages (Fakhraee 2002)

### Micro-credits:

The major beneficiaries of micro-credit programs are rural women and low-income groups who use the micro-credits to improve their social and economic status. Bowman (1997) gives a short but clear definition of micro-credit in his book, which is as follows:

"Small, short, collateral-free"; In other words micro-credit means providing small loans without any thing as security for low income people and they'll pay back the loan in a short period of time. (Arab Mazar and Motamed, 2005)

For the past two decades, micro-credit has been one of the solutions considered in order to expedite investment process and strengthen the financial bases in rural and deprived areas. Empowerment and poverty eradication in deprived communities through improving productivity are all results of micro-credit. Micro-credit has proven its value in development as an effective tool in struggling poverty and hunger. It has the ability to change and improve people's lives, especially people in need.

In micro-credit programs there are some other parts like small saving accounts and deposits; that's why they are presented as a credit-saving program (Moazami and et al, 2005).

The two terms in "micro-credit" refer to tow fundamental concepts that it is dealing with. The first

term “micro” refers to inefficiency of classical economists’ development methods. Focus on the term “micro” implies revising the market’s economical recommendation in rural development. Small and micro-scale activities are the ones done within the local markets with goal of providing livelihood for households and with least link to the national and international economy. The second term “credit” refers to rural circumstances and lack of official sources which is a critical problem for them. By designing a micro-credit plan, the system is trying to provide credit sources for poor families and increase efficiency of rural market. In micro-credit system, production is mostly local and industrial, therefore economic surplus in these programs is relatively low. Micro-credit system is widely applied in countries that their national economic program is not capable of creating job and income generating opportunities for the majority of society. (Najafi, 2006)

### **Micro-credit characteristics:**

#### **1- Empowerment**

Empowerment is one of the major goals of micro-credit and it’s considered as a proper index to evaluate it. Creating self-reliance and self-confidence in people, empowerment is one of the important factors to deal with poverty. It also creates social capacity.

Empowerment plans include:

1. Forming financial groups and creating social capacity
2. Education as a supplementary factor of credit-saving
3. Assigning management of credit plans to members

#### **2- Stability**

Stability is a fundamental characteristic for a comprehensive development program and leads to continuance of the program and makes credit-saving plans different from others.

Stability indicators:

- reduce dependence on external financial resources
- reduce trading expenses
- cut the loan subsidies (Banihashem, 1999)

#### **3- creating and expanding income generating activities**

A study conducted by World Bank about micro financial institutions highlights three most frequent goals:

1. Creating employment opportunities for members
2. Increasing vulnerable groups’ income and

productivities

3. Reduce family’s dependence on agriculture in droughts’ prone areas

### **The role of micro-credits in poverty eradication:**

The first application of micro-credit was about 20 years ago with the establishment of Grameen Bank in Bangladesh. This bank, providing credit for the poor (particularly women as 94% of its clients are them), has managed to increase income and economic welfare. Now the program is running in most parts of world especially Asia, Africa and Latin America. One interesting point is that unlike prior perceptions, the poor covered by micro-credit programs has been very successful in paying back their loans.

In the countries that credits are provided in a proper financial manner, not only it has increased production and income but also it has encouraged poor to save a part of their income. These savings can be an important support for the institutes providing micro-credits and can be a financial base for more loans and all these result in institutes’ financial dependence.

With the new way of micro-credit payments, in addition to covering poor’s financial needs, a combination of other services and facilities are available for them; such as saving accounts, educational services, and cooperation possibilities (Goetz and Sengupta, 2003).

### **Discussion and results:**

In the new system of advanced agricultural economy, the value of women’s work that previously was unpaid labor now must be paid in cash. Expect for agriculture which is rural women’s main work field they have rarely participated in tow other fields of economy. The most important issue of women’s social and political participation is to take part in planning, decision making, implementation of decisions, and evaluation of results. Generally they have had a little share in such processes. Although in recent years rural women have participated more in villages’ management, social and cultural organizations, and cooperative institutions’ management; but having a lower level of literacy, education, income and social status than urban women they still have the smaller share of administrative and official jobs. Some barriers to women’s participation which can be categorized in 3 groups of personal, familial, and social include: low literacy level, large volume of work both inside and outside of home for many reasons including seasonal migration of men and the great diversity of rural women’s activities(nursing, housekeeping, agriculture, handicrafts, livestock,...), malnutrition, low health indicator, Patriarchal structure of society, father or husbands disagreement with a woman’s participation

in social and economic activities for various reasons like cultural reasons or unwilling to lose the labor force at home, negative attitudes towards women's abilities, gender discrimination, family's poverty, superstitious beliefs, misleading customs like fatalism, law access of women to credit and facilities, inaccessibility of extension services, men-orientated social activities and participation plans, deficiency of professionals needed to educate rural women, problems of access to health services and social facilities, low income of rural women compared with men, lack of non-governmental organizations dealing with rural women's problems, few women managers in rural area. (Rahimi, 2001)

Nowadays, micro-credit and micro-financing have changed people's lives; it has brought back life to poorest and richest communities of the world. So we can easily observe a great increase in people's access to general financial services. Facilitating the access of families to financial services, they begin to invest on educational expenses, healthcare, healthy nourishment, trading, and housing based on their priorities. Overall in many countries financial plans mostly focus on women. Women, provided with financial facilities, will receive a loan, guarantee to pay it back, keep their saving account and also they'll have insurance coverage. Micro-financial plans have an important message for families and communities. Many studies have proven that women's access to mentioned facilities may improve their conditions in family and society; it also helps them feel more self-confident and makes them aware of their own abilities. Thus providing micro-credit services for the poor in society is a powerful tool to reduce poverty and so that they are able to create assets, earn more money and become less vulnerable against the economic pressure. Of about 1.3 billion poor in the world there are 900 million poor women, this obviously shows that poverty has a feminine face. According to UN's development fund, 10% of world's income and less than 10% of world's assets belongs to women. While a majority of them never possess the capital needed for their activities, women still play an important role in the economic development of country. Therefore women draw the micro-credit policy maker's attention more than others. Choosing women as the main target of micro-credit plans is an effective strategy to eradicate poverty; because their income will upgrade the family welfare; furthermore earning money improves their social status. In some countries this choice is influenced by society's attitude and culture (Araghzadeh, 2002).

For instance founder of Grumman Bank of Bangladesh, Mohammad Yunes, has stated that: "women have plans for themselves, their children, and their family life; they always have an overlook while

men just look for fun" to explain why 94% of their clients are women.

Women's access to micro-credits have shown that their income benefit to improve their family and provide livelihood. In addition to all these another reason of women being the target of micro-credit plans is that women have higher loan recovery rates. Totally, expanding women's access to micro-credits may lead to many useful results which in economy is mentioned as "virtuous spiral"; because their access to micro-credits results in family welfare and in a broader point it'll improve community's welfare and shall be increased welfare this process is repeated.

In researches that conducted by Nanda (2004) became clear that women participation in credits programs had positive effects on their demand about health care. Fiona Steele and et al (2008) in researches that conducted as called " influences of credits programs on empowering women at Bangladesh , found that women who joined to credits programs , have participated in more educational programs and have married with more educated men and also they have saved more and they had more cash .

Shahnaj and Chaudhury(2009) in research as "credits and its role on empowering women " concluded that there is meaningful relation between attending in credits programs and empowering women , at economical dimensions .

Maybe the main challenges that threaten credits associations , is lack of necessary emphasizes on social dimensions and on reinforcing their basics , that practically cause that this social foundations lose its efficiency soon and practically changed to unsuccessful institution .

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Ellen and her Colleagues (2009) used approach called it "credits and education at Bolivia, Ghana, Honduras, Mali and Thailand". This approach looks for empowering women through financial services with education. In this approach, women get familiar with importance of credits through education and extension and also familiar with ways to access it through establishing different groups.

Ruhal Amin and others (2010) found that those who joined credit funds had more ability rather than those who didn't.

Jameela (2010) presented that credit programs has shown lot of affects on empowering women so that has increased their social, politic and economic ability.

Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society.

A study conducted by Chabokru et al (1384) shows the crucial importance of micro-credits for farmers who do not possess physical financial assets (land, building, livestock, well...) and work in agricultural sector because of environmental conditions (such as living in a village) or because it's their ancestral occupation.

So today, women's participation in sustainable economic, social, and cultural development in rural areas is not optional but an essential matter. Those communities that have not seriously considered the necessity of participation faced failures and delayed community's development, welfare and security process. In any community, village, or social group, broad participation of every women in decision-making and any other matter related to national or local development programs, is a key variable in social sciences and in the last few decades, it has interested many scholars of socio-economic and especially cultural issues, and is considered as one of the most fundamental democratic rights of women in a society. As we know in a popular participation, all people are given the opportunity to participate in planning and decision making for their society and for their own future. When in practice women feel that they can be involved in planning, policy making and deciding or solving problems in the society certainly they'll feel more solidarity and become more interested in social, economic, and cultural development programs.

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**References:**

1. Amiri, Soodabeh. Female centered sustainable human development. *Journal of Agricultural and Development Economics*, 2000, No. 9.
2. Araghzadeh, M. institutions active in the field of providing financial services to rural women. *Conference Proceedings rural women micro-credit. (Volume II)*, 2002. 167-153.
3. Banihashem, F. Rural women, education, association and participation. *Jihad Journal village*, 14 years, No. 310, 1999, p. 21.
4. Bakhshoodeh M. and Habibullah Salami. Article "The role of agricultural banks in reducing poverty with emphasis on micro-credit." *Conference on rural development and poverty reduction, agricultural banks, Tehran, 2005.*
5. Chabokru. GH, Mokhtari, D. and Abdshahi. A. Paper "of micro-credit on the value added of agricultural sector in Iran." *Conference on rural development and poverty reduction, agricultural banks, Tehran, 2005.*
6. Ellen Vor der Bruegge, Maureen Plas, Christopher Dunford and Kathleen E. Stack. *Credit with education: a self-financing way to empower women*, 2009.
7. Farghdan, M. *Cultural Arts Festival the first report of rural women. Monthly Jihad*, 2001, No. 243-242.
8. Fakhraee, S. *Economic and social effects of their financial reliance of women in rural communities*, 2002.
9. Fiona Steele, Sajeda Amin and Ruchira T. Naved. *The Impact of an Integrated Micro-credit Program on Women's Empowerment and Fertility Behavior in Rural Bangladesh*, 2008.
10. Fami. Sh. *Analytical process to determine the educational needs - extension of rural women (Part I). Jihad Magazine*, 2001, No. 243-242.
11. Goetz, A. and Rina Sengupta, R. "Who Takes the Credit? Gender, Power, and Control over Loan Use in Rural Credit Programs in Bangladesh." *World Development* 24 (1), 2003, 45-63.
12. Ghaffari, GH. *The role of women and social development. Women's Magazine*, 2000, No. 10, p. 15.
13. Hashemi, S., Sidney R. Schuler, S., and Ann P. Riley. "Rural Credit Programs and Women's Empowerment in Bangladesh." *World Development* 24 (4), 2004, 635-653.
14. Jameela v. a. *Micro credit, empowerment and diversion of loan use*, 2010.
15. Lahsaeizadeh, A. *Sociology of rural development. Tehran: Publication Days*, 2000, p. 58.
16. Mozami, M, Rahimi A. and Azam tayefe Heidari. "Coverage and sustainability of micro-credit programs, case study of rural women micro-credit fund" *Research Center for Rural Women and Rural Affairs Ministry of Agriculture*, 2005.
17. Nanda. P. (2004). *Women's participation in rural credit programs in Bangladesh and their demand for formal health care: is there a positive impact? Center for Health and Gender Equity. USA. , 2004.*

18. Paknazar, F. S. (2000). Major factors affecting the agricultural extension workers in the central province among rural women in farming year 79-78. MSc thesis, Tehran: Islamic Azad University, Science and Research Rahmani andalibi. S. "Need, principles, mechanisms and advantages of micro-credit programs in small business development and improvement of rural women." Conference Proceedings Volume II of rural women micro-credit and promoting people's participation Deputy Ministry of Agriculture - Bureau of Women Affairs in collaboration with Al-Zahra University, Agricultural Bank, Tehran, 2001.
19. Ruhailamin, Yiping Li and Ashraf U. Ahmad. Women's credit programs and family planning in rural Bangladesh, 2010.
20. Shaditalab, Zh (2002). Development and challenges of women. Publishing drop.
21. Shahnaj Parveen and Sajedur Rahman Chaudhury. Micro-credit intervention and its effects on empowerment of rural women: the Bangladesh experience, 2009.
22. UNICEF (United Nations Children's Fund) and the Office of President of Women's Affairs (1997). Role of women in development. Publications roshangaran
23. Varzgar, Sh. and Azizi, M. Evaluation of labor force participation of rural women in cotton production and its related factors in the region and dome of Gorgan, 2001, P. 318.
24. Woroniuk, B and Schalkwyk, J., micro-credit and equality between women and men. Stockholm, Sweden, 1998. Available on the WWW: [www.sida.se](http://www.sida.se)

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## 评北师大赵峥教授的量子疑难观 ----21 世纪新弦学概论 (3)

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**摘要：**什么叫“量子”？就是  $(E)(t)=h$  和  $(J)(L)=Q$  的联立，它们不能分开；分开就不完整，也不完备。庞加莱猜想完整和完备了从宏观到微观分立物体或量子的形象：球与环兼备，既能扩散，也能收缩。

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**关键词：**量子疑难 新设计 庞加莱猜想

### 一、什么为量子疑难观

2011 年 3 月 3 日《南方周末》发表北京师范大学物理系教授赵峥先生的文章《霍金的“新设计”》，其中表达了一种在我国带普遍性的量子疑难观；笔者同意作者说的这应值得探讨。

赵峥先生的文章是这样说的：“著名的量子论专家也说：有人告诉我懂得量子论。他错了，我敢说世界上还没有一个人真正懂得了量子论”。

“世界上还没有一个人真正懂得了量子论”，这就是“量子疑难观”。赵峥教授是赞同这位著名的量子论专家的观点的，他列举了 4 条证据：

A、我们宇宙中的物质是和时空一起创生的，在创生的初期，由于存在猛烈的物质涨落和时空涨落，量子效应起主导作用。然而，如何把量子论和弯曲时空（即广义相对论）结合起来却是十分困难的事情。到现在为止，虽然学术界在电磁场、电子场等各种物质场的量子化中取得了极其成功的进展，但引力场量子化的工作却遇到了意想不到的巨大困难。

B、到目前为止，所有试图把引力场量子化的理论（包括超弦和圈量子引力理论）都存在问题。

C、在物理学发展过程中，量子论引起的疑义始终多于相对论。量子论留给了人们太多的争议。爱因斯坦曾经说过，我思考量子论的时间几乎是思考相对论的 100 倍，但是我还是不清楚什么是光子。

D、在对宇宙创生和宇宙初期演化的研究中，霍金也只能应用尚不成熟的量子宇宙学和量子引力理论。他试图边对宇宙进行研究，边发展量子引力理论，这就增加了科学研究成果的不确定性。

赵峥教授以上的意思，就是说发展了近一百多年来的量子论，也都还不成熟。这与郭汉英先生

前经常宣传的“科学不成熟观”相似。但赵峥教授与郭汉英教授还有一些区别：郭汉英教授较绝对，类似主张打倒重来；而赵峥教授说得较灵活，他说：“不过，人类探索自然的过程，一般都是这样进行的。开创性的发现大都是在不充分成熟的条件下取得的”。并且赵峥教授还主张：“如何解决，确实是一个需要研究的问题”；因为“对当代自然科学前沿有所了解的哲学家，几乎是凤毛麟角。这一现象肯定会影响哲学的发展。当然，现代科学技术发展迅猛，要求每一位哲学家了解其中的精髓也是勉为其难的事情。这个问题需要解决，否则哲学不可能健康发展”。

郭汉英教授和赵峥教授都是我国科学殿堂内的著名理论物理学家，作为门外汉，我们评论什么也没有用。但我们已逐渐认清，近一百多年来的理论物理学发展，科学家是需要有才能的；但才能是没有最大才能的，任何最大才能类似都要分开。因为才能的实践环境是有学派标签的，学派一般分为主流和非主流两类。在一个类似具体的量子论或相对论原理的观点上，一个人不可能既是主流观点宣传的卖力者，又是非主流观点宣传的卖力者。这里我们不说主流和非主流观点的正错，所以即使一个人有最大的才能，他的才能在整个全局中也是减半的。即使一些人的观点，既是主流又是非主流两类都包含有的认识，但站在一个学派实践的立场上，他们的最大的才能被分成两半，两半中又各自减一半，合起来在全局也只是一半。

其次，才能的实践要面对国内和国际学派的环境，所以为具体的国家需求服务，即使科学殿堂内的理论物理学的学派主流和非主流，在国内和国际某些时期并不一定是同步的。例如在国内是主流，



在国际是非主流的情况也有。因为理论物理学和工程物理学不同。工程物理学是跟成熟的技术跑，造原子弹、氢弹，是以造出原子弹、氢弹为准，不是以造不出为准。理论物理学就不一定是这样，主流一般是跟国家的。当然科学实践是有客观标准的。所谓的“李约瑟难题”，像是站在国际主流的立场上说的话。如不用两重标准，今天“李约瑟难题”也许仍高悬我国。所以是郭汉英教授和赵峥教授极力反对的，即应该站在国内主流的立场上说话，这也许包括超弦和圈量子引力理论、量子论和弯曲时空的国际主流科学都不成熟。而且这也许是我国科学殿堂内外的大多数人都赞同的。但今天没有了李约瑟难题，如果不是两重标准，过去也没有。但主流带来的后果真先进，丘成桐、李政道等一些院士也不一定赞同。丘成桐要回国来宣传超弦理论和庞加莱猜想，李政道要回国内来宣传夸克—胶子等离子体，不是多余？国家建设需要先进科学技术，而这需要类似大型强子对撞机科学实验的支持。

我们希望李约瑟难题今天和过去，是不存在的。因为在国内科学殿堂外，也许在国际主流探索之前或者同时，就有中国人的身影，但他们不在国内需要的主流内，加之不熟悉外文等障碍，以及个人收入不高或能够支助者也不懂国际主流的行市，事情自生自灭也就过去了。

## 二、李政道和丘成桐的优势

21世纪时代毕竟不同，2006年在北京国际弦理论大会上，丘成桐先生提及弦理论已经到了重大的革命性的前夜时说，中国在这个领域进行研究的人非常少，还不如印度和韩国的多。丘成桐先生非常焦虑，认为研究弦理论需要在物理、数学上下功夫。

如何下功夫？2006年国际弦理论大会之前，在北京举办的中美高能物理未来合作研讨会上，李政道的报告认为，解决诸如质量起源、电荷本质、量子引力、基本粒子世代重复之谜等，必将引发新的物理学进展。实际上李政道先生揭示的是，在整个轻子方面可能存在着一个以前从未揭示过的分立对称性及其破坏，导致中微子相互作用的本真态和质量本真态相联系的映射矩阵与中微子的质量矩阵之间建立起非常确定的联系。李政道的这项研究密切关系到质量起源的问题，意义非同寻常。

因为在宇宙诞生之初，物质是一种超炽热、极致密的东西，由一些被称为夸克和胶子的粒子组成，它们到处乱跑，横冲直撞。加上少量的电子、光子和其他较轻的基本粒子，这种混合物的温度比太阳核心还要炽热10万倍以上。人们把这种混合物称为夸克—胶子等离子体，因为混合物的行为类似一团超炽热等离子体的带电粒子气体，就像闪电内部的气体一样。类似普通气体在迅速膨胀时会冷却一样，随着宇宙膨胀，温度直线下降，夸克和胶子的速度

大为减慢，以致其中一部分开始能暂时地粘连在一起。将近10微秒时间流逝之后，夸克和胶子被它们之间的强作用力捆绑在一起，永久地囚禁在质子、中子和其他强相互作用粒子之中。类似液体水冻成冰的相变，物质属性的这种突然改变也被称作相变。

宇宙的这场相变，在北京高亮度正负电子对撞机上的实验以及未来的极高能量电子直线对撞机上的实验，通过把重原子核对撞在一起，创造出短暂释放夸克和胶子的微型大爆炸，也许能观察到从质子和原子中释放出来的夸克和胶子。目前发现这种奇异物质的行为，类似一种液体，而不是气体。它们处于一种集体的准自由态，类似宇宙最初几微秒内的物质一样。从最初的夸克—胶子混合物转变成平凡的质子和中子，原初那片粒子海洋遗留下来的“水滴”，就是今天由质子和中子构成的每一个原子核。它们是微小的亚原子囚室，夸克在其中左冲右突，却被永远囚禁；即使在剧烈碰撞中，夸克看似就要脱缰而出，新的“墙壁”又会形成，将它们继续禁锢在一起。

20世纪末之前揭示的夸克幽禁、暗物质、对称破缺、真空性质之谜，发展出的大统一理论、超对称、超引力、超弦理论等，尽管人们试图以此解释宇宙演化成目前高度有序状态的过程，了解夸克和胶子所涉及的基本作用力；我们也期望通过中美高能物理合作和其他国际合作，在探索电弱对称性破缺机制、质量的起源、超对称性的存在性和破缺、物质和反物质的不对称性等基本前沿研究方面取得成就，但是中微子相互作用的本真态和质量本真态相联系的映射矩阵与中微子的质量矩阵之间，建立的非常确定的波粒二象性，仍然联系从宏观到微观物理学的双缝实验的判据，这涉及庞加莱猜想与不确定性原理的等价问题。

## 三、庞加莱猜想引出质能先验与经验图像

庞加莱猜想是：单连通的三维闭流形同胚于三维球面。后来被推广为：任何与 $n$ 维球面同伦的 $n$ 维闭流形必定同胚于 $n$ 维球面。例如，一个无孔的橡胶膜相当于拓扑学中的二维闭曲面，而一个吹胀的气球则可以视为二维球面，二者之间的点存在着——对应的关系，同时橡胶膜上相邻的点仍是吹胀气球上相邻的点，反之亦然。庞加莱猜想最简单的学术描述是：一个封闭的三维空间，若其上的每条闭曲线都可以连续收缩到一个点，那么从拓扑结构上看，这个空间是否就是一个球面。

这个猜想要追求严格，能量和物质的先验与经验图像就有两个分岔：如果这个汽球只是一个长形的，或者球形的，那是可以做到的。但是，如果这个汽球是一个救生圈的形状，那就不行。因此要求的汽球，它的形状虽然可以随意，但是，里面的任何一根封闭的曲线，或者说绳套，都不会绕过一根

类似柱子这样的东西，或者说，这个汽球看上去没有“孔”，不象救生圈那样，可以把一个头伸进去。这样的汽球，数学家起了一个名字叫“单连通”。所以庞加莱猜想引出两个能量和物质的先验与经验图像：类似球体（简称类点体）和类似圈体（简称类圈体）---这对于任何正、负、虚、实、零五元数的时空都是适用，所以成为几何、数学和物质思维中的超验客体，为 21 世纪的球量子与环量子之争所注意。这是其一。

其二，庞加莱猜想把一个封闭的三维空间连续收缩到一个点，是把宏观与微观世界都包括在一起了，必然引来与海森堡的不确定性原理的等价性。而庞加莱猜想实际是用确定性表达的：即“一个封闭的三维空间，若其上的每条闭曲线都可以连续收缩到一个点，那么从拓扑结构上看，这个空间就等价于一个球面”。它的奥妙是：闭曲线是一个被分割的图案，它指一种“间断”；“连续”收缩指它的行为不间断。两者趋近于无穷小，能成立，就等价于三维球面。写成数学表达方式：无穷小量间断 (J) 乘无穷小量连续 (L) = 球面 (Q)；或

$$(J)(L) = Q \quad (3-1)$$

有人说，历史上早就存在过光具有波动性与粒子性之争。量子理论的核心基础是小孔和双缝实验。量子力学是先有数学描述，后有物理解释的。普朗克公式中的普朗克常数恒量  $h$ ，是普朗克仿效微积分的微商的办法而假定的数。一开始普朗克常数是指波包的每一小份能量取决于它的频率，而在频率范围内存在有许多平均速度的粒子或电子，并非像后来爱因斯坦把一个光子当作一个光子或粒子来对待处理，把量子看成是一份一份地辐射。这是从某一点上来考虑的，因为瞬时有若干粒子同时辐射，我们就无法区分分辨那一点的空隙是多少？通过什么技术手段来制造？是否海森堡的《物理学和哲学》就认为：只观察到了波动性，从来就没有看见粒子呢？对于粒子性只在想象或概念中存在，我们不管，反正海森堡的测不准原理或叫不确定性原理，波与粒之争，测双缝时存在，测单缝时不存在。它的计算取其中一种是：无穷小量能量（对应点外空间）乘无穷小量时间（对应点内空间）=普朗克常数；或

$$(E)(t) = h \quad (3-2)$$

比较上式 (3-2) 和上式 (3-1)，类似一个人的两种行为和思维处理方法，它们形成一个棱锥形。式 (3-2) 类似棱锥形一端逃出势阱联系的扩散，式 (3-1) 类似棱锥形一端遇到障碍联系的收缩，它们构成了从宏观到微观物质不可分离的特性，能够解答从宏观到微观所有波与粒之争的疑难。这里什么叫“量子”？就是 (3-2) 和 (3-1) 的联立，它们不能分开；分开就不完整，也不完备。爱因斯坦说：“上

帝不掷骰子”，他是主张“量子”为确定论的，实际是偏向式 (3-1) 一方。玻尔学派主张“量子”波与粒互补，是一种势阱和隧道效应模型，而成为一种不确定论，实际是偏向式 (3-2) 一方的。由于理论物理学至今没有提出庞加莱猜想与不确定性原理等价问题，所以到 21 世纪，在量子论和相对论已经产生的“场论”之外，还有不少专业和非专业人士不断提出新的以太、晕轮、轮晕、一锅盐渍蘑菇汤、可压缩流体、唯道等之类的介子模型场论，但这都不是根本的办法。

量子论和相对论已经建立的场论，包含有一种“势阱”方法的描述，但只有扩散力，没有收缩力---各类基本粒子，有各类自己的“场”，已经够多、够扩散的了；但这只是一种单一的量子行为和思维处理方法，遇到障碍就不知如何处理。所以这些量子论和相对论的场论，是一些单一程序的类似没有脑袋思维的场量子。庞加莱猜想完整和完备了从宏观到微观分立物体或量子的形象：球与环兼备，既能扩散，也能收缩。

#### 四、宏观粒子性势阱解释

人类在过去的一个世纪中，对物质结构组成的探索已经发现有五个层次：A、一切物质都是由原子构成的；B、原子是由电子包围着的原子核组成的；C、原子核又是由质子和中子组成的；E、每个质子和中子被认为是由三个夸克组成的；E、虽然暂时还没有证据表明，夸克和轻子有任何内部结构，但目前科学家普遍相信弦是组成物质的最基本单元；在极小的尺度下观察，自然界的基本单元不是像电子、光子、中微子和夸克等等这样的粒子，这些看起来像粒子的东西实际上都是一些小而小的振动的弦的闭合圈（称为闭合弦或闭弦），所有粒子都可通过闭弦的不同振动和运动来得到，从本质上讲，所有的粒子都是质地相同的弦。

1、先说势阱。这些研究成果中的标准模型认为：轻子（像电子和中微子）夸克以及将这些粒子捆绑在一起的电磁力、弱相互作用力、强相互作用力，构成一种类似山凹模型的“势阱”图相。把粒子比作汽车，相互作用力比作过山车轨道。在一条过山车轨道上，车子停在最低点。这种“势阱”图相都是原子层次以下的事情，海森堡不确定性原理不允许一辆过山车呆着不动。这辆过山车必须永远地在最低点附近不停地运动。

这就使得车子的能量和质量的匹配，在五个层次变得很复杂和多样。在第五个层次的闭弦能量与质量不相匹配，源于夸克和轻子虽然被看成是物质的基本粒子，但是它们还可能由更小的东西组成的，这些小东西被禁闭在比质子的千分之一还要小的体积内，这妨碍了对有关它们内部结构的猜测。因为测不准原理在复合系统的大小和在其内部运动

的任何组元的动能之间，确定了一种互递原理；复合系统愈小，组元的动能就愈大。从这个原理可以得出，闭弦和开弦必须有很大的能量：它要高于一千亿电子伏，还可能更大。这是因为对于质子及其夸克组元，由质子的有效半径可以计算它的组元夸克的典型能量，结果发现，它和质子本身的质量是可以相比的。组元的能量一般是几亿电子伏，系统的总质量至少也是同样的数量级，为产生夸克系统的激发态所需要的能量也是同样的量级，被确认为质子激发态的强子在质量上要比质子大 30% 到 100%，因此说，对原子、原子核和质子，系统的质量至少和组元的动能一样大。由于闭弦和开弦的能量高于一千亿电子伏，人们或许会猜测，它们所形成的复合粒子的质量会是几千亿电子伏或者更高。而实际上，已知夸克和轻子的质量要小很多。在电子和中微子的情况下，质量至少要小 6 个数量级。整体要比它的各部份的总和要小得很多。

2、再说势阱的隧道效应。式(3-2)这个  $(E)(t) = h$  的海森堡不确定性原理是指，在量子力学里，如果时间确定是  $t$ ，就无法把能量  $(E)$  测量得比  $E = h/t$  精确。反过来说，一个微观粒子囚禁在势阱中，如果势阱变得不太高或不太宽，粒子能“借”到一些能量  $E$  来越过势阱，只要在时间  $t = h/E$  内把能量还回去，隧穿势阱的可能性有的。

势阱和隧道效应这两点对宏观物体来说，与微观物体的区别是很明显的。我们地球上的宏观物体虽然也囚禁在“势阱”中，但这个势阱主要指自身和环境的引力和电磁力的相互作用，这也使得宏观物体的能量与质量不相匹配：宏观物体除含有本身的环境重力产生的引力势能外，静止的宏观物体本身就只含有质量。按质能公式  $E = mc^2$  比较，势能与质量的不相匹配，使它自身难“借”到环境很大的能量。反过来，宏观物体都是由原子、分子构成的，原子、分子之间自身的电磁力相互作用，倒能把宏观物体分为固体、液体、气体三类势阱。固体这类电磁力势阱，把原子、分子囚禁得很死，一般不能发生扩散。液体这类电磁力势阱，对原子、分子的囚禁稍微放宽一些，使液体扩散能发生波动和流动。气体这类电磁力势阱，对原子、分子的囚禁更放宽一些，使气体更能扩散发生波动和流动。

庞加莱猜想与不确定性原理存在等价，是由双缝实验证明的，具有广泛的应用性。例如，把无孔的球和有孔的环这两个不同的几何图相，映射双缝实验中的源、屏、监测器等三种约束。第一种情况来看宏观粒子的势阱性解释。

源用粒子取子弹对应。屏是刻有两条平行狭缝的装甲板。监测器是收集子弹的小沙盒。用一挺机枪以固定速率射击，子弹碰撞也不会分裂。在给定

的时间内， $P_1$  是只有狭缝 1 打开狭缝 2 关闭时射到沙盒里的子弹的分布概率； $P_2$  是狭缝 1 关闭狭缝 2 打开时的概率； $P_{12}$  是两条狭缝都打开时的概率结果，这时子弹从哪条狭缝通过完全是随机的。测量发现，两条狭缝都打开时，每个盒子里子弹的数目，是两次只有一条打开而另一条关闭实验时子弹数的和。

$$P_{12} = P_1 + P_2 \quad (4-1)$$

在这里，子弹这类固体势阱虽然获得了机枪给的动能和势能，但比起子弹中的原子、分子之间自身的电磁力相互作用仍很小，所以子弹是不能扩散的，当然也无所谓收缩，除了运动的子弹对周围的空气产生冲击振动而会有声波外，方程式(4-1)并不会受它影响。

## 五、宏观波动性势阱解释

第二种情况来看宏观的波动性势阱解释。

源用波圈取掉进一个大水池的石头产生的水波对应。屏是用一道有两个缺口的堤坝。监测器是一排小浮标，随着水波上下浮动，能测出水波在该点的总能量。水波从波源扩散到堤坝，在堤坝的另一面水波从两个缺口向外扩散，观察那排浮标，一定会有某些位置，从缺口 1 来的波的波峰与缺口 2 来的波峰相遇，引起浮标剧烈地上下运动。而在别的一些地方，从一个缺口来的波峰会遇到另一缺口来的波谷，这样这些位置的浮标会一动不动。 $I_1$  是只有缺口 1 打开时波强的平滑变化。这条曲线与子弹实验获得的曲线  $P_1$  非常相似。 $I_2$  是关闭缺口 1 开放缺口 2 得到的波强的平滑变化，它与子弹实验获得的曲线  $P_2$  也非常相似。 $I_{12}$  是两个缺口都打开时的波强变化曲线，但与用子弹双缝齐开实验时的曲线非常不同，它不等于分别用一个缺口打开时获得的曲线  $I_1$  和  $I_2$  的和。

对于水波来说，在任意的给定位置水波的能量与这一点波浪的最大高度的平方成正比。如果把每秒钟到达浮标的能量称为“波强”，用  $I$  表示，波的最大高度记为  $h$ ，其关系是：波强 = 高度平方，即  $I = h^2$

$$(5-1)$$

这里，与用子弹（球体）做的实验，水波（环圈）的能量不是以确定大小的个体（小块）形式到达监测器的，因此可以看出原始波的能量扩散了，而子弹在任何一个特定时间只能打到某一个特定的盒子里。 $I = h^2$  的数学解释是，沿探测器任何一点水面的波动幅度，是分别缺口 1 和缺口 2 来的波动幅度的和。如果把从缺口 1 来的波的高度记为  $h_1$ ，从缺口 2 来的记为  $h_2$ ，两个缺口都打开时的记为  $h_{12}$ ，最后的结果可以写成：

$$h_{12} = h_1 + h_2 \quad (5-2)$$

这几个高度值可以为正也可以为负。这是根据相应的波动使水高与还是低于水平面而定。最后的强度  $I_{12}$  也叫“水波振幅”的平方：

$$I_{12}=h_{12}^2 \quad (5-3)$$

也就是  $I_{12}=(h_1+h_2)^2$ 。这与缺口 1 打开，缺口 2 关闭实验对应的水波强度的波动幅度的平方

$$I_1=h_1^2 \quad (5-4)$$

以及缺口 2 打开，缺口 1 关闭的水波强度  $I_2$  的波动幅度的平方

$$I_2=h_2^2 \quad (5-5)$$

都不同， $I_1$  和  $I_2$  两条曲线都没有曲线  $I_{12}$  摆动得剧烈。因为两个缺口都打开时的曲线  $I_{12}$ ，不是两个缺口分别的打开时强度分布  $I_1$  和  $I_2$  的简单叠加。因为  $I_{12}=(h_1+h_2)^2$  可以展开成

$$I_{12}=h_1^2+2h_1h_2+h_2^2 \quad (5-6)$$

$I_{12}$  不等于  $I_1$  与  $I_2$  之和  $I_1+I_2=h_1^2+h_2^2$ 。对于波动（环圈），这种现象叫做干涉，不像用子弹（球体）把两个单缝打开时的实验结果加起来得到双缝都打开的结果。其实，宏观波动性与宏观粒子性之所以不同，因为宏观波动性是以能量势阱为主的现象，而宏观粒子性是以质量势阱为主的现象。如果把水密封在子弹中，水的波动干涉现象也不复存在。这里水波动的环圈看似间断，它之所以能连续地扩散和收缩，是因为这种能量势阱是放在质量势阱的“场”中的，即水波是在水场中，大水池及堤坝两边都是水；这水的势阱由水池的边界面积和重力等在约束，质量水场的场粒子的微单元是电磁力约束比固体小的分子、原子。

宏观波动性势阱与宏观粒子性势阱的共同点，是它们都在分子、原子层次之上，其中都存在是巨大分子、原子数目在电磁力和重力下的组合。子弹作为单独的个体，自身不能扩散和收缩，和周围“场”的联系，和实验要观察的现象相差太远。而水波的环圈作为单独的个体，是镶嵌在水的“质场”中，能扩散也能收缩；这和刚体的环圈也不同。即如果环圈现象与周围“场”的组成层次联系的更小单元分布没有联系，也会和子弹的情况类似。例如，绳子产生的波，或弹簧产生的波，除和周围质量空气“场”的组成层次分子、原子这种更小单元分布有联系，而再产生的声波外，是无法产生类似水波和水场那种双缝的实验的。

## 六、微观波粒合一性势阱解释

有人说，双缝干涉与小孔衍射和透镜与棱镜及电子、X 射线衍射等的什么光环、带、线都是一回

事，都不是单个的粒子所能形成的；单个的粒子无论如何也不会形成波，单个粒子无论如何也是不能同时穿过两个孔自己与自己相干涉---通过一个孔是一个粒子，当通过二个孔时粒子变成两个了吗？假如再用更多的缝来观察呢？单个粒子同时通过双缝而进行自我相互干涉说明了什么，具有可分性还是单个粒子吗？

其实量子理论的难题，是人们不愿意用势阱和隧道效应模型，统一解释能量和物质的宏观与微观的先验与经验图像；或者没有把庞加莱猜想与不确定性原理等价，去统一解释能量和物质的宏观与微观的先验与经验图像。例如，以宏观的粒子性和波动性来看微观，由于微观单独的粒子和它周围的场，到底是子弹类似的质量势阱为主，还是水波类似的能量势阱为主，或者还是两者兼之，因为不能用肉眼或手直接去检查，只能用实验才能检验，反过来才能决定，所以与宏观的常识矛盾就有所难免。我们来看第三种微观的势阱双缝实验：

源用未知是粒子或波图像的电子对应；由一根发热的金属丝和一个电子能加速的电势场组成，金属丝发热后能够把电子“蒸发”出来。屏是一块有两条窄缝的薄金属片。监测器是一块表面有磷的屏幕，当有一个电子打到屏幕时，能发出一次闪光。这像子弹每次射进某一个小盒子那样，而不是像水波那样能量扩散开； $P_1$  是只有狭缝 1 打开时的情形， $P_2$  是只有狭缝 2 打开时的情形。这两条曲线跟用子弹实验时完全一样，区别在第三次实验  $P_{12}$  上，也就是两条狭缝都打开时，这个结果就像用水波实验得到的干涉图案。这需要两条狭缝中出现某种波动才能产生，因为它不是  $P_1$  和  $P_2$  的和。但电子又的确是像子弹那样打到屏幕上的，所以电子这样的量子物质同时具有波动和粒子运动的属性。但又跟波和粒子不一样。它是把宏观中类似子弹质量球，水波能量圈及它周围水波场，和绳子或弹簧振动波等图像，都结合起来，产生的对应。

用庞加莱猜想与不确定性原理等价的解释，不是简单地说，因为庞加莱猜想三维球涉及的是宏观，而连续收缩为一点，又涉及微观问题，不确定性原理能解决电子的双缝实验问题，如果庞加莱猜想证明是完备的，应该也能解决---道理是这样，但实际要复杂得多。我们要解释的是为什么微观粒子会有上面那三种对应？

首先，源用未知是粒子或波图像的电子，它作为微观的粒子，是分子、原子层次以下的粒子，它的质量和能量的匹配，就与子弹不同。其情况大致是：原子系统的总质量是 10 乘 11 次方 eV，组元的动能是 10 乘 35 次方 eV；原子核系统的总质量是 10 乘 11 次方 eV，组元的动能是 10 乘 7 次方 eV；质子系统的总质量是 10 乘 10 次方 eV，组元的动能是 10

乘 10 次方 eV ;夸克或轻子系统的总质量是 10 乘 10 次方 eV ,组元的动能是 10 乘 15 次方 eV。即电子势阱组元本身的质量已小于匹配的能量。说穿了,它能发生“隧道效应”,即它能发生扩散。

这与水波圈相似。但也有三点不同。第一,它类似电磁场的传播,是变化的电场产生变化的磁场,变化的磁场又产生变化的电场---这种圈套圈类似的循环,间断又连续的扩散。不像水波的波圈的传播,本身要依靠水池的水场水分子、原子等质量微单元作介质。电子势阱组元本身的质量匹配能量,其周围发生的“场”,是希格斯质量场。希格斯粒子用作质量的最小单位,是 0.01 乘 10 的-11 次方 GeV,我们称为希格斯粒子质量微单元。变化的希格斯质量场类似圈套圈循环的电磁场,因此它不再依靠周围空间类似电磁场等场源作传播介质。

第二,它也不类似电场、磁场或者水场是满状的,也不像电磁波或者水波的传播,其中的间断与连续只有扩散运动,没有线旋、面旋、体旋运动。

第三,不像电磁波或者水波的传播是耗散的。水波和电磁场等的扩散,可以看成是到无限远或能量耗尽为止。变化的希格斯质量场的扩散,类似绳子和弹簧的振荡,振荡完了,绳子和弹簧的质量并没有变,耗散的只是外加的能量。电子势阱组元本身质量匹配能量的“隧道效应”扩散,类似量子涨落,是  $E(t) = \hbar$  方程锁定的,不是耗散振荡。如果发生这类振荡会破坏它的扩散,反而具有回收作用。

现在我们来看电子的小孔衍射实验。电子从源发出,电子希格斯质量场发生扩散,到屏遇到小孔,振荡第一次发生庞加莱猜想收缩,成为第二次“源点”。但出了小孔,又重复电子希格斯质量场扩散,此称小孔衍射。现在来看电子的双缝干涉实验。电子从源发出,电子希格斯质量场发生扩散,到屏遇到双缝,这是两个小孔,电子也类似人有思维,要解决庞加莱猜想,答案是不能收缩为一点,只能一分为二:一部分匹配能量随质量体通过一条狭缝,另一部分匹配能量穿过另一条狭缝。这类似一笼蜂子,蜂王类似质量体,蜂王外的蜂群蜂子类似匹配能量,穿过双缝,蜂子要归笼。这是其一;其二,穿过双缝,质量体通过的那条狭缝成为的第二次“源点”要扩散,另一部分匹配能量穿过的那条狭缝成为的第二次“源点”也要扩散,这要产生干涉,也要发生振荡。第三,这种振荡是由于一分为二的两个“源点”变化的希格斯质量场的扩散,弱的“源点”要影响强的“源点”,也要复归强的“源点”;强的“源点”也要影响弱的“源点”,振荡由此循环发生,直到收归探测器;而且这种振荡使质量体原来的路线和落脚点,发生随机偏移。其次,也类似电子中微子振荡现象;在太阳中微子失踪案中,电

子中微子振荡还会变成质量更大的  $\nu_\mu$  中微子和  $\nu_e$  中微子。

这就是微观粒子为什么会有上面那三种对应的来源。从庞加莱猜想  $(J)(L) = Q$  方程分析,宏观的子弹、水波,到微观的电子等双缝实验看出,屏只留单缝时,它们三者的监测器获得的图相是等价的;与屏是全封闭情况一样。屏是全封闭,它等价于球面是确定的,类似连续和间断都是一样。这是因为屏只留单缝时,屏有间断是确定的,但子弹、水波、电子三者是在确定的间断的区域内收缩,由此取舍的连续,是在间断的区域内收缩。它虽然也涉及屏单缝的边沿是封闭线,该封闭线向缝不能连续收缩到一个点,但这也类似全封闭时整个屏的外沿与空间分界的封闭线,反向空间不能连续收缩到一个点一样,是等价的,可以对等约去。在屏单缝间断内的封闭线因是单质的,它的每条闭曲线都可以连续收缩到一个点,所以也等价于球面。

而在双缝实验中却不同。从屏的实体来说,两个缝产生的是两处间断,一处对另一处不能连续收缩到一个点是确定的。所以如果单缝屏还可等价于球面,对简单的双缝屏就不等价于球面了。有趣的是,著名科学家费曼的遍历求和证明:如果这种双缝无限增多,类似屏成为一个“白板”---没有屏时,那么它又等价于球面,即子弹、水波、电子三者的图象运动又等价了。庞加莱猜想的内禀意义联系双缝实验,是一个众所周知的从宏观到微观物理学的老实验,也许都认为它只是一个人为的实验,不具有普遍的、自然的意义。实际错了。例如,宏观中大多数物质都存在晶格,微量量子通过晶格间的狭缝是很普遍、自然的事,这类似双缝实验。又如,太阳核反应中产生的大量电子中微子,在到达地球前要经过太空的电离层、分子云,其类似双缝实验产生的质量振荡现象,已为观察所知。

## 参考文献

- [1][美]里克·坦普尔·贝尔,数学大师---从芝诺到庞加莱,上海科技教育出版社,徐源译,2004年12月;
- [2][美]伦纳德·萨斯坎德,黑洞战争,湖南科学技术出版社,李新洲等译,2010年11月;
- [3]王德奎,三旋理论初探,四川科学技术出版社,2002年5月;
- [4]孔少峰、王德奎,求衡论---庞加莱猜想应用,四川科学技术出版社,2007年9月;
- [5]王德奎,解读《时间简史》,天津古籍出版社,2003年9月;

[6]刘月生、王德奎等,“信息范型与观控相对界”研究专集,河池学院学报2008年增刊第一期,2008年5月;

[7]叶眺新,中国气功思维学,延边大学出版社,1990年5月;

[8]王德奎,从卡--丘空间到轨形拓扑,凉山大学学报,2003年第1期;

[9]叶眺新,自然全息律,潜科学,1982年第3期。

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## Comparing between Traditional Degrees and online degrees in distance education

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**Abstract:** The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections. Technology transports information, not people. Distances between teachers and students are bridged with an array of familiar technology as well as new information age equipment. What sets today's distance education efforts apart from previous efforts is the possibility of an interactive capacity that provides learner and teacher with needed feedback, including the opportunity to dialogue, clarify, or assess. Advances in digital compression technology may greatly expand the number of channels that can be sent over any transmission medium, doubling or even tripling channel capacity. Technologies for learning at a distance are also enlarging our definition of how students learn, where they learn, and who teaches them. No one technology is best for all situations and applications.

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### Introduction:

Hence, considering the position and role of education in the third millennium on the basis of ICT is also a serious approach to the topic with the knowledge community centered on learning and general trends of technological tools to enjoy much of the information and Find the appropriate place in the information society Third Millennium That actually can be a global community and is without limit is undeniable-and-run. Guidance and therefore move in the direction of society should be education and technology for comprehensive pandemic done. Considering the above definitions and with the knowledge and attitudes towards the third millennium and the desirability and some weaknesses in the achievement of certain standards and dynamic structures in order to achieve a knowledge based society, there is. In the present circumstances to provide our information infrastructure development and integration inevitably link the elements and tools that they are as indicators of technology education and technology education will be remembered. In the new context of combining these two indicators comes to training facilities and a variety of tools that will provide guidance and development in information will be very effective.

In other words, the country still in the feasibility assessment and appropriate to make public the

necessary training for operation and application of

scientific principles and technological tools is has been done and why certain movements and sometimes non-normative point will not be able node an unlock.

The conditions and according to the capacity of developing countries and training facilities required a knowledge-based society feels is felt. If all processes in technology education and technology optimization and standardization of the Hungarian education should go, and appropriate channels that the best option in this area could benefit from state universities is capabilities.

According to the information in the development of any society should take half of the world to progress until the necessary coordination and synchronization global developments so as to accept the design structure of a knowledge-based society have a special place for the University and respect the role of education and technology was In designing a model with global standards of dynamism and flexibility at first be necessary to select a sample that the facilities and communications needed for this purpose provide action and then determine optimal cognitive deficiencies than Hammett and weaknesses push.

No doubt the experiences of implementing these standards and to develop troubleshooting information using technological tools would be much more

economical. That if we develop a range of information from a city university level and conduct more successful we'll be more acceptable was. Because the utilization and application tools and step up the information they've been successful. Therefore the most important first step needed to coordinate and synchronize technology education and educational technology standards and capability in the high user acceptability of the world is also enjoyed.

### WHAT IS DISTANCE EDUCATION?

Distance education is a method of education in which the learner is physically separated from the teacher and the institution sponsoring the instruction. It may be used on its own, or in conjunction with other forms of education, including face-to-face instruction. In any distance education process there must be a teacher, one or more students, and a course or curriculum that the teacher is capable of teaching and the student is trying to learn. The contract between teacher and learner, whether in a traditional classroom or distance education, requires that the student be taught, assessed, given guidance and, where appropriate, prepared for examinations that may or may not be conducted by the institution. This must be accomplished by two-way communication. Learning may be undertaken either individually or in groups; in either case, it is accomplished in the physical absence of the teacher in distance education. Where distance teaching materials are provided to learners, they are structured in ways that facilitate learning at a distance.

### The Cons of Online Degree Programs

Here are the main shortcomings:

#### 1. Credits and Accreditation

Remember that not all online institutions are accredited or have the required accreditation.

Some online degree credits are transferable and some are not – It is important to find the level of accreditation that the online institution provides – Regionally or nationally accreditation.

There are however, those online institutions which are considered to be on the par with established traditional education systems.

#### 2. Suitability

It's best not to idealize online programs and what they offer.

Studying from home may sound great, but not everyone has the right environment at home for academic study. For some people, specially designed campuses are ideal to get away from the distractions of the home and to immerse yourself in study.

### 3. No face-to-face human interaction

Online degree programs and online courses have their advantages, but they lack human interaction. These prevent the normal interactions between students and teachers, relegating any queries to the message boards and forums.

Only video interaction may be possible with online degree programs and its exact use and frequency vary from institution to institution, while the actual classes are given via archived modules.

For those who prefer human interaction, online degree program may not be the best option.

### 4. Independent study isn't good for all

Online degree study may require better comprehensive skills than traditional education.

In traditional classroom environment, it may be easier to understand instructional material because of the human proximity and the option to ask questions and get immediate sympathetic answers.

### Are Online Degrees Worth Anything? Are Online Degrees Credible?

Many people consider online degrees as not worthwhile proposition.

They think online degrees are a waste of time and money; further, they feel such degrees are not recognized anywhere.

### So, are online degree programs worth anything?

Well, it is quite natural to have apprehensions about something that you do not know about. In fact, when online courses were newly launched, they were widely unaccepted by many corporations and campus based educational institutions. However, the situation has now changed.

Online degrees are gaining popularity. Further, such



degrees are being offered and widely accepted. As per a recent survey conducted by Distance Education and Training Council, more than 71% of corporations consider online degrees as 'more valuable' and worthwhile than the traditional one.

How can one understand the value of an online degree?

Though, surveys mark online degrees with certain amount of credibility, how does one make sure the value attached?

### Online Degree Program: Should you go for it?

The first question asked is –

#### Is an online degree worth anything? What is the real Value of online degrees?

Check for the accreditation! The accreditation attached to the online degree is the key here.

As for any campus based degree program, there are accredited online degrees and non accredited online degrees based on the online school accreditation. Therefore, the accreditation of the online educational institution must be checked carefully.

For more information, refer to Online Schools Accreditation Meaning. Let us acquaint ourselves with the merits and demerits on online degrees for understanding the value attached.

### Merits of online degrees:

1. **Ease of Access:** The course material and instructions can be accessed by a student from anywhere across the globe. This can be done via an internet connection. This provides greater freedom to students and working professionals to study the course material.

2. **Genuine interactivity:** Online courses provide students with a high level of interactivity. How? Since the students are far apart geographically, they have more time to ponder over the facts and get back with logical reasoning and viewpoint. This is not so in case of traditional classes.

3. **Dissemination of information:** Online courses have the advantage of reaching out to larger masses as compared to traditional studies. Further, additions and

amendments can easily and more quickly be disseminated to students.

4. **Documentation:** The best part of online courses is every material, discussion, presentation and interaction is electronically documented. Thus, a student can refer to such documents anytime, anywhere.

Perhaps, the only demerit of online degree is the kind of infrastructure it requires. An online course requires a sound IT infrastructure that can support the smooth functioning of online class rooms.

### Earn a Degree Online: Why Get a Degree Online?

These days, one can get a degree without going to college. Online education is the latest concept that has taken the world of education by storm.

Though online education is still in its initial stages in many parts of the world, it becomes a great option, particularly in the western world, and has certain advantages over traditional education, which makes it so popular.

Online education is not just advantageous to the teachers, but has its advantages for the students too. While teachers can make decent money by teaching online, students can also get online degrees in a simple manner.

This article addresses the first questions asked about online degrees – Why Earn an Online Degree?

### Why get a degree:

The first questions asked by many who are just starting up: Why do I need a degree? What should I get a degree in?

No degree means no job and thus no money. Needless to say that, without a degree your chances for getting a decent job on the job market are limited – Employers take it as the first selection criteria.

Refer to the categories – Choosing a Career Path and Online Education Degrees for getting a complete picture and more information on career & degree choices.

## Why get a degree online?

The first question asked naturally is – Why an Online degree and not the traditional degree?

Both ways are good as long as you look for an accredited online degree.

An online degree is absolutely not less Qualitative – There is no difference between the value of a traditional degree and an online degree given that – You will check very carefully the accreditation of the online educational institution before taking a degree program online.

If you are wondering whether you should get an online degree, you would be surprised to know that many people have no other choice but to opt for an online degree.

There are several reasons why one needs to get an online degree, but the most common are:

- In many cases, people need extra degrees to pursue a career in a profession that they are interested in.
- Many people do not continue their education for a number of reasons, and by the time they are ready to pursue their education, they are working or even have a family. An online education makes life simpler for people like them.

## Why take Online Degree program?

Consider the pros and cons for online education and traditional education, before choosing either one.

## Online degree choices – What are the choices?

Online education provides almost the entire scope of education, starting from an Associate degree up to PhD degree online. There are streams of education, and even some professional specialized courses. For example:

- You can complete your school or college education via the online universities.
- You can also get other, professional degrees online such as, a degree for managers a MBA, Master of Business Administration online.
- Professional course, online learning – You can complete computer courses online and get a

certificate, a diploma. These courses are best fit for people who want to advance their professionalism with a specific online degree of their industry for getting a lift up off their career.

Therefore, if you are thinking how to get a degree at home, you would first need to decide which degree is of your interest – Which degree you want to get.

## Conclusion:

In general, new methods of educational systems to countries around the world as a necessity and need for learning and training opportunities to study in areas with different climatic features and conditions of learning and education according to their gender and cultures, has been. Each method is mentioned with regard to changes in features and creates an education system, and evaluation is used. Judgement of distance education in an educational way, first as a necessity to eliminate barriers to educational climate and geographical areas, age and gender restrictions learners began their work And more in a death education system, especially in the philosophy and goals based on theories of learning theories have evolved to find and promote professional growth. Approach to distance education with regard to the necessity of education in countries formed.

Emergence and development of information societies is the consequences of industrialization. Despite the diversity of information in various forms of media in local, national and international, access, exchange and use of various information easier than last time is. Information society, a member of your buddies know that open information system in terms of geographical location and the last 25 years, organizational development, are limited. Distance learning faster than other forms of training has been.

Growth factor in the economic interests of this type of educational approach, flexibility and remove the distance can be named. The methods of distance education, required for building physical education is not providing services. Teachers and trainers in this method - compared with traditional methods - and have more opportunities to more people than are being trained. In this type of teaching style of each person in each academic field, and each job can be arbitrary in time and space, trained without having to leave the house for work or business is education. This method requires that students are dispersed over long distances provides. Distance learning advantages of distance education in comparison with traditional education, the need for physical locations and training programs limited to no specific time period. In this type of

teaching style, learning for life without possibility of spatial and temporal constraints for each individual there. In distance education, problems related to lack of qualified teachers and appropriate educational environment - as it posed in the traditional method of M is - is resolved. In this way the use of advanced features in digital libraries and search the various sites during the study, time and cost savings are.

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**References:**

1. Alharthi, Mohammad A (2003). a High quality portal frame work for asynchronous learning networks: intellectual capital aggregation and organization, doctorate thesis, Vanderbilt university.
2. Allison. chlin.& others (2002). an integrated framework for distributed learning environments.
3. Almogbel. Ali N (2002). distance education in Saudi Arabia: attitudes and perceived contributions of faculty, students, and administrators in technical college, doctorate thesis, university of Pittsburgh.
4. Al-saleh, Mary Margaret (2002). a description and comparision of RN\_ BSN Nursing student, perception of student \_ teacher relationships in traditional and internet distance education nursing courses. DNSC, widener university school of nursing .
5. Anonymous (2001). history of distance education and training council (75 years). Distance education and training council washington.
6. Armstrong, Amy Jo (2002). an investigation of personal – social contextual factors of the online adult learner: perceived ability to complete and succeed in a program of study. Doctorate Thesis, Virginia commonwealth university.
7. Barron, D (1996). Distance education in north American library and information science education: Application technology and commitment. journal of the American society for information science. Vol.47 ,No.11.
8. Bates,T (1995) .Technology, open learning and distance education London:Routledge.
9. Beetham. H., & Sharpe, R. (eds.) (2007). *Rethinking pedagogy for a digital age: Designing and delivering e-learning*. London: Routledge.
10. Boltone , sharon Bauer (2002). Developing an instrument to Analze the application of adult learning principles to world wide web distance education courses using the Delphi technique. EdD.university of louisville.
11. Bonk, C., & Graham, C. (eds.). (2006). *Handbook of blended learning: Global perspectives, local designs (pp. xvii - xxiii)*. San Francisco: Pfeiffer.
12. Carter , A (2001). Interactive distance education: implication for adult learner, *Interautional Media*, 28(3), PP: 249-261.
13. Chizari, M, Mohammad ,H and linder ,J.R (2002). Distance education competencies of Faculty members in Iran
14. Crossfield, N. L. (2001, May/June). Digital reference: the next new frontier. *Latitudes*, 10(3). Retrieved July 16, 2005, from <http://nmlm.gov/psr/lat/v10n3/digitalref.html>
15. Dodds, T., Perraton, H., & Young, M. (1972). *One year's work: The International Extension College 1971-1971*. Cambridge, UK: International Extension College.
16. Faulhaber, C. B. (1996). Distance learning and digital libraries: Two side of a single coin. *Journal of the American Society for Information Science* 47(11), 854-856.
17. Gandhi, S. (2003). Academic librarians and distance education challenges and opportunities. *Reference & User Services Quarterly*, 43(2), 138-154.
18. Garrels, M. (1997). Dynamic relationships: Five critical elements for teaching at a distance. Faculty Development Papers. Available online at: Indiana Higher Education Telecommunication System ([http://www.ihets.org/distance\\_ed/fdpapers/1997/garrels.htm](http://www.ihets.org/distance_ed/fdpapers/1997/garrels.htm) 1).
19. Garrison, D. R.; H. Kanuka (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education* 7 (2), 95-105.
20. Garrison, R., & Vaughan, N. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: Jossey-Bass.
21. Garrison, J. A., Schardt, C., & Kochi, J. K. (2000). web – based distance countinuing education: a new way of thinking for students and instructors. *Bulletin of the Medical Library Association*, 88(3), 211-217.

22. Grimes, G. (1992). Happy 100th anniversary to distance education. Retrieved August 25, 2005, from <http://www.macul.org/newsletter/1992/nov,dec92/going.html>
23. Husler, R. P. (1996). Digital library: content preservation in digital world. *DESIDOC-Bulletin of Information Technology*, 16(1), 31-39.
24. Jeffres, M. Research in distance education. Retrieved August 20, 2005, from <http://www.ihets.org/distance-ipse/fdhandbook/research.html>
25. Katsirikou, A., & Sefertzi, E. (2000). Innovation in the every day life of library. *Technovation*, 20(12), 705-709.
26. Lebowitz, G. (1997). Library service equity issue. *The Journal of Academic Librarianship*, 23(4), 303-308.
27. Lipow, A. G. (1999, January 20). Serving the remote user: reference service in the digital environment. In *Proceedings of the ninth Australasian information online & on disc conference and exhibition*.
28. Littlejohn, A., & Pegler, C. (2007). *Preparing for blended e-learning*. London: Routledge.
29. McLean, D. D. (1996). Use of computer-based technology in health, physical education, recreation, and dance. ERIC Digest 94-7. Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education. ED 390 874.
30. Moore, M. (ed.). (2007). *Handbook of distance education*. New Jersey: Lawrence Erlbaum Associates.
31. Oliver, M., & Trigwell, K. (2005). Can blended learning be redeemed? *Elearning*, 2 (1), 17-26.
32. Parrott, S. (1995). Future learning: Distance education in community colleges. ERIC Digest 95-2. Los Angeles, CA: ERIC Clearinghouse on Community Colleges. ED 385 311
33. Rintala, J. (1998). Computer technology in higher education: An experiment, not a solution. *Quest*, 50(4), 366-378. EJ 576 392
- Romiszowski, A. (1993). Telecommunications and distance education. ERIC Digest 93-2. Syracuse, NY: ERIC Clearinghouse on Information Resources. ED 358 841
34. St. Pierre, P. (1998). Distance learning in physical education teacher education. *Quest*, 50(4), 344-356. EJ 576 391
35. Strain, J. (1987). The role of the faculty member in distance education. *American Journal of Distance Education*, 1 (2).
36. Summers, M. (1997). From a distance: Or, how I learned to love my "tv" class. Faculty Development Papers. Available online at: Indiana Higher Education Telecommunication System ([http://www.ihets.org/distance\\_ed/fdpapers/1997/summers.html](http://www.ihets.org/distance_ed/fdpapers/1997/summers.html)).

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## Using the methods of Distance Education in Agriculture

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**Abstract:** The contract between teacher and learner, whether in a traditional classroom or distance education, requires that the student be taught, assessed, given guidance and, where appropriate, prepared for examinations that may or may not be conducted by the institution. This must be accomplished by two-way communication. Learning may be undertaken either individually or in groups; in either case, it is accomplished in the physical absence of the teacher in distance education. Where distance teaching materials are provided to learners, they are structured in ways that facilitate learning at a distance. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections.

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**Keywords:** Distance Education , Agricultural Education

### Introduction:

Enjoying and giving publicity to any of technological tools with the aim to facilitate and accelerate the training process, as well as increase the quality and quantity of knowledge quality and knowledge of a serious intelligence community needs to integrate and standardize the educational system society is.

Guidance and therefore move in the direction of society should be education and technology for comprehensive pandemic done. Considering the above definitions and with the knowledge and attitudes towards the third millennium and the desirability and some weaknesses in the achievement of certain standards and dynamic structures in order to achieve a knowledge based society, there is. In the present circumstances to provide our information infrastructure development and integration inevitably link the elements and tools that they are as indicators of technology education and technology education will be remembered. In the new context of combining these two indicators comes to training facilities and a variety of tools that will provide guidance and development in information will be very effective. While the effect of these two indices of body functions and its other fields (favorable to foster new ideas provides. Technologies training web-based technology as one of the most effective learning tools in educational issues have been identified and a total of E-learning as it is referred. . But

if the scientific and cultural infrastructure with this technology's Day is not

coordinated development of information will be obtained. This weakness caused by lack of growth and development of training required for pandemic knowledge of existing technology is. In many systems of scientific tools and capabilities needed to provide hardware and commissioning are still technological problems resulting from lack of knowledge of poverty and poor education in these centers to be seen.

In other words, the country still in the feasibility assessment and appropriate to make public the necessary training for operation and application of scientific principles and technological tools is has been done and why certain movements and sometimes non-normative point will not be able node an unlock.

The conditions and according to the capacity of developing countries and training facilities required a knowledge-based society feels is felt. If all processes in technology education and technology optimization and standardization of the Hungarian education should go, and appropriate channels that the best option in this area could benefit from state universities is capabilities.

According to the information in the development of any society should take half of the world to progress until the necessary coordination and synchronization global developments so as to accept the design structure of a knowledge-based society have a special place for

the University and respect the role of education and technology was In designing a model with global standards of dynamism and flexibility at first be necessary to select a sample that the facilities and communications needed for this purpose provide action and then determine optimal cognitive deficiencies than Hammett and weaknesses push.

No doubt the experiences of implementing these standards and to develop troubleshooting information using technological tools would be much more economical. That if we develop a range of information from a city university level and conduct more successful we'll be more acceptable was. Because the utilization and application tools and step up the information they've been successful. Therefore the most important first step needed to coordinate and synchronize technology education and educational technology standards and capability in the high user acceptability of the world is also enjoyed.

#### **Educational methods in distance learning:**

Today, under the new system replaced the traditional systems of learning and learning week (ie tutoring methods, lectures) are:

##### **- Multimedia courses:**

These courses and widely used elements of image, communication, graphics and simulated components, animation and communication elements for guidance and tips, and talk back on course and curriculum issues are held.

##### **- Enhanced communication mechanisms:**

The mechanism of any texts simultaneously, and asynchronous audio-visual communications to protect you. This case allows students to practice on topics learned will give.

##### **- Written test:**

thus, question and test via a distributed communication network, are corrected and returned. These exams through video conferencing support and runs.

##### **-Virtual Seminar:**

thereby different groups of students in different geographical environments linked together makes.

##### **- Collaborative virtual laboratories:**

the laboratory of the Group's activities are supported. Workshops such as software engineering.

##### **-Smart academic factors:**

academic factors that inform intelligent, support and guidance students pay.

#### **Remote educational tool:**

distance learning tools and supplies various uses. These tools in four main courses are:

##### **A - Audio Tools:**

Audio tools include training such as two-way interactive telephone, video conference, shortwave

radio and a strain of tools such as audio tape and radio.

##### **B - Image tools:**

including slides, films, video tapes and video conferences.

##### **C - Data:**

computers as electronic data are sent and received. Because the data word description for a wide range of educational tools is used.

Computer applications for distance education are varied and include the following:

1- Training to Computer Management.

2 - Computer Assisted Instruction.

3 - through PCs.

4 - e-mail, telegraph, computer conference and the World Wide Web simultaneously.

##### **D - Print:**

The main element of distance education programs, particularly in the exchange and delivery system information tools are considered.

#### **Conclusion:**

Distance education delivers classes (live or pre-taped) to students in their home, office, or classroom. It is used by K-12, higher education, continuing education and business. As the cost of delivering quality education increases, institutions find that limited resources prevent them from building facilities, hiring faculty, or expanding curricula. They are using distance education to maximize resources and are combining their assets with others to produce programming. Distance education is offered internationally, nationally, regionally, and locally over all forms of conferencing technology.

Distance learning is expanding and examples of it are increasing dramatically. Fewer than 10 states were using distance learning in 1987; today, virtually all states have an interest or effort in distance education. Distance learning systems connect the teacher with the students when physical face-to-face interaction is not possible. Telecommunications systems carry instruction, moving information instead of people. The technology at distant locations are important and affect how interaction takes place, what information resources are used, and how effective the system is likely to be.

Technology transports information, not people. Distances between teachers and students are bridged with an array of familiar technology as well as new information age equipment. What sets today's distance education efforts apart from previous efforts is the possibility of an interactive capacity that provides learner and teacher with needed feedback, including the

opportunity to dialogue, clarify, or assess. Advances in digital compression technology may greatly expand the number of channels that can be sent over any transmission medium, doubling or even tripling channel capacity. Technologies for learning at a distance are also enlarging our definition of how students learn, where they learn, and who teaches them. No one technology is best for all situations and applications. Different technologies have different capabilities and limitations, and effective implementation will depend on matching technological capabilities to education needs.

Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home.

The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections.

Interactivity is accomplished via telephone (one-way video and two-way audio), two-way video or graphics interactivity, two-way computer hookups, two-way audio. Interactivity may be delayed but interaction provided by teacher telephone office hours when students can call or through time with on-site facilitators. Classes with large numbers of students have a limited amount of interactivity. Much of the activity on computer networks is on a delayed basis as well. Possibilities for audio and visual interaction are increasingly wide.

In the earlier days of distance learning, it was most common to see distance learning used for rural students who were at a distance from an educational institution. The student might watch a telecourse on a television stations, read texts, mail in assignments and then travel

to the local college to take an exam. This model is still in use, but as the technology has become more sophisticated and the cost of distance learning dropped as equipment prices dropped, the use of distance education has increased.

High front-end costs prevented an early widespread adoption of electronically mediated learning. Distance learning has been aggressively adopted in many areas because it can meet specific educational needs. As the concept of accountability became accepted and laws required certain courses in high school in order for students to be admitted to state colleges, telecommunications was examined as a way to provide student access to the required courses. Many rural school districts could not afford the special teachers to conduct required courses. Distance education met this need by providing courses in schools where teachers were not available or were too costly to provide for a few students. It also fulfilled a need for teacher training and staff development in locations where experts and resources were difficult to obtain. These systems link learner communities with each other and bring a wide array of experts and information to the classroom.

Challenges which faced the early users of distance education are still with us today. If distance education is to play a greater role in improving the quality of education, it will require expanded technology; more linkages between schools, higher education, and the private sector; and more teachers who use technology well. Teachers must be involved in planning the systems, trained to use the tools they provide, and given the flexibility to revise their teaching. Federal and state regulations will need revision to ensure a more flexible and effective use of technology. Connections have been established across geographic, instructional, and institutional boundaries which provide opportunities for collaboration and resource sharing among many groups. In the pooling of students and teachers, distance learning reconfigures the classroom which no longer is bounded by the physical space of the school, district, state or nation.

The key to success in distance learning is the teacher. If the teacher is good, the technology can become almost transparent. No technology can overcome poor teaching which is actually exacerbated in distance education applications. When skilled teachers are involved, enthusiasm, expertise, and creative use of the media can enrich students beyond the four walls of their classroom.

Teachers need training in the system's technical aspects and in the educational applications of the technology.

Areas for assistance include the amount of time needed to prepare and teach courses, how to establish and maintain effective communication with students, strategies for adding visual components to audio courses, ways to increase interaction between students and faculty, planning and management of organizational details, and strategies for group cohesion and student motivation.

The interchange of ideas requires different communication methods than in conventional classrooms: information technologies are predominantly visual media, rather than the textual and auditory environment of the conventional classroom, the affective content of mediated messages is muted compared to face-to-face interaction, and complex cognitive content can be conveyed more readily in electronic form because multiple representations of material (e.g., animations, text, verbal descriptions, and visual images) can be presented to give learners many ways of understanding the fundamental concept.

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**References:**

1. Alharthi, Mohammad A (2003). a High quality portal frame work for asynchronous learning networks: intellectual capital aggregation and organization, doctorate thesis, Vanderbilt university.
2. Allison. chlin.& others (2002). an integrated framework for distributed learning environments.
3. Almogbel. Ali N (2002). distance education in Saudi Arabia: attitudes and perceived contributions of faculty, students, and administrators in technical college, doctorate thesis, university of Pittsburgh.
4. Al-saleh, Mary Margaret (2002). a description and comparison of RN\_ BSN Nursing student, perception of student \_ teacher relationships in traditional and internet distance education nursing courses. DNSC, widener university school of nursing .
5. Anonymous (2001). history of distance education and training council (75 years). Distance education and training council washington.
6. Armstrong, Amy Jo (2002). an investigation of personal – social contextual factors of the online adult learner: perceived ability to complete and succeed in a program of study. Doctorate Thesis, Virginia commonwealth university.
7. Barron, D (1996). Distance education in north American library and information science education: Application technology and commitment. journal of the American society for information science. Vol.47 ,No.11.
8. Bates,T (1995) .Technology, open learning and distance education London:Routledge.
9. Beetham. H., & Sharpe, R. (eds.) (2007). *Rethinking pedagogy for a digital age: Designing and delivering e-learning*. London: Routledge.
10. Boltone , sharon Bauer (2002). Developing an instrument to Analze the application of adult learning principles to world wide web distance education courses using the Delphi technique. EdD.university of lousville.
11. Bonk, C., & Graham, C. (eds.). (2006). *Handbook of blended learning: Global perspectives, local designs (pp. xvii - xxiii)*. San Francisco: Pfeiffer.
12. Carter , A (2001). Interactive distance education: implication for adult learner, *Interautional Media*, 28(3), PP: 249-261.
13. Chizari, M, Mohammad ,H and linder ,J,R (2002). Distance education competencies of Faculty members in Iran
14. Crossfield, N. L. (2001, May/June). Digital reference: the next new frontier. *Latitudes*, 10(3). Retrieved July 16, 2005, from <http://nml.gov/psr/lat/v10n3/digitalref.html>
15. Dodds, T., Perraton, H., & Young, M. (1972). *One year's work: The International Extension College 1971-1971*. Cambridge, UK: International Extension College.
16. Faulhaber, C. B. (1996). Distance learning and digital libraries: Two side of a single coin. *Journal of the American Society for Information Science* 47(11), 854-856.
17. Gandhi, S. (2003). Academic librarians and distance education challenges and opportunities. *Reference & User Services Quarterly*, 43(2), 138-154.
18. Garrels, M. (1997). Dynamic relationships: Five critical elements for teaching at a distance. Faculty Development Papers. Available online at: Indiana Higher Education Telecommunication System ([http://www.ihets.org/distance\\_ed/fdpapers/1997/garrels.htm](http://www.ihets.org/distance_ed/fdpapers/1997/garrels.htm) l).



19. Garrison, D. R.; H. Kanuka (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education* 7 (2), 95-105.
20. Garrison, R., & Vaughan, N. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: Jossey-Bass.
21. Garrison, J. A., Schardt, C., & Kochi, J. K. (2000). web – based distance continuing education: a new way of thinking for students and instructors. *Bulletin of the Medical Library Association*, 88(3), 211-217.
22. Grimes, G. (1992). Happy 100th anniversary to distance education. Retrieved August 25, 2005, from <http://www.macul.org/newsletter/1992/nov,dec 92/going.html>
23. Husler, R. P. (1996). Digital library: content preservation in digital world. *DESIDOC-Bulletin of Information Technology*, 16(1), 31-39.
24. Jeffres, M. Research in distance education. Retrieved August 20, 2005, from <http://www.ihets.org/distance- /ipse/fdhandbook/research.html>
25. Katsirikou, A., & Sefertzi, E. (2000). Innovation in the every day life of library. *Technovation*, 20(12), 705-709.
26. Lebowitz, G. (1997). Library service equity issue. *The Journal of Academic Librarianship*, 23(4), 303-308.
27. Lipow, A. G. (1999, January 20). Serving the remote user: reference service in the digital environment. In *Proceedings of the ninth Australasian information online & on disc conference and exhibition*.
28. Littlejohn, A., & Pegler, C. (2007). *Preparing for blended e-learning*. London: Routledge.
29. McLean, D. D. (1996). Use of computer-based technology in health, physical education, recreation, and dance. ERIC Digest 94-7. Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education. ED 390 874.
30. Moore, M. (ed.). (2007). *Handbook of distance education*. New Jersey: Lawrence Erlbaum Associates.
31. Oliver, M., & Trigwell, K. (2005). Can blended learning be redeemed? *Elearning*, 2 (1), 17-26.
32. Parrott, S. (1995). Future learning: Distance education in community colleges. ERIC Digest 95-2. Los Angeles, CA: ERIC Clearinghouse on Community Colleges. ED 385 311
33. Rintala, J. (1998). Computer technology in higher education: An experiment, not a solution. *Quest*, 50(4), 366-378. EJ 576 392
- Romiszowski, A. (1993). Telecommunications and distance education. ERIC Digest 93-2. Syracuse, NY: ERIC Clearinghouse on Information Resources. ED 358 841
34. St. Pierre, P. (1998). Distance learning in physical education teacher education. *Quest*, 50(4), 344-356. EJ 576 391
35. Strain, J. (1987). The role of the faculty member in distance education. *American Journal of Distance Education*, 1 (2).
36. Summers, M. (1997). From a distance: Or, how I learned to love my "tv" class. Faculty Development Papers. Available online at: Indiana Higher Education Telecommunication System ([http://www.ihets.org/distance\\_ed/fdpapers/1997/summers.html](http://www.ihets.org/distance_ed/fdpapers/1997/summers.html)).

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## Variability and Association Studies in Land Races of Lentil Collected From South-Eastern Rajasthan

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**Abstract:** Evaluation of the existing variability in the available germplasm and working out the inter-relationship among yield and its contributing traits is necessary to develop high yielding cultivars of any crop. Keeping this in view, variability and association studies were conducted in a set of 55 diverse lines of lentil (including two checks) collected from South-Eastern parts of Rajasthan, India. Sufficient variability was present in the germplasm for days to flowering, plant height, number of fruiting branches per plant, number of pods per plant, 100- seed weight and seed yield. Days to flowering and plant height had high heritability coupled with high genetic advance while days to maturity had high heritability with moderate genetic advance. Seed yield showed significant positive genotypic correlation with all the traits studied. Pods per plant had maximum direct effect on seed yield followed by 100- seed weight and plant height. Number of fruiting branches per plant had negative direct effect on yield. Pods per plant and 100- seed weight were identified as important yield components; hence selection should be focused on these traits for yield improvement in lentil.

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**Key words:** *Lens culinaris*; variability; genetic advance; correlation

### 1. Introduction

Lentil (*Lens culinaris* Medikus) is an important crop for human food, animal feed and cropping systems in West Asia, the Indian subcontinent, Ethiopia, North Africa, and to a lesser extent in Southern Europe. It is considered to be the oldest and widely adapted *rabi* pulse crop. As food, it provides 24-25 % protein along with vitamins and micronutrients *viz.*, Fe, Zn,  $\alpha$ -Carotene. It is considered to be the most efficient crop in fixing atmospheric nitrogen through rhizobium. In India, it is being cultivated in 1.51 m ha area with production of 0.95 m tones (Singh, 2009). The crop being drought tolerant and moderately cold resistant is remunerative for dry areas. Therefore, it becomes necessary to develop lentil varieties best suited for the dry conditions with conserved moisture. Genetic improvement, in turn, will require information on the extent of genetic variability in the available germplasm. The effectiveness of selection depends on magnitude of variability for yield and component traits. Study of inter-relationship among yield and

contributing traits is also necessary. When more variables are correlated with yield, it is important to identify appropriate traits for selection. In such case, path analysis provides an effective means of finding out direct and indirect contribution of different component traits towards seed yield. Keeping all these facts in view, the present investigation was planned to study variability and association between yield and its components in indigenous advance breeding lines of lentil.

### 2. Materials and methods

The experimental material comprised of 55 indigenous genotypes of lentil including two checks DPL 62 and JL 3, grown in the experimental field of the Agricultural Research Station, Ummadganj, Kota, Rajasthan, India during *rabi* 2008-09 under rainfed condition. These genotypes were collected from different areas of South-Eastern Rajasthan. The trial was laid down in Randomized Block Design with three replications with the spacing of 30 cm and 5 cm

between and within the rows, respectively. Each genotype was accommodated in paired rows of 4 m length. The crop was raised following the recommended cultural practices without irrigation. The Observations were recorded on ten randomly selected competitive plants from each plot per replication on 10 metric traits *viz.*, plant height (cm), number of fruiting branches per plant, number of pods per plant, number of seeds per pod, 100 –

### 3. Results

The analysis of variance revealed significant differences among the genotypes for all the traits studied indicating the existence of sufficient genetic variability in the experimental material. A few genotypes were found to be significantly superior to the checks *viz.* DPL 62 and JL 3 (Table 1). Out of fifty three genotypes, eight genotypes for days to 50 % flowering and nine genotypes for days to maturity were found significantly superior to the checks. Eight genotypes were also superior to the checks for producing fruiting branches per plant. The genotypes namely RKL 14 (123.20); RKL 308 (119.90); RKL 310 (117.20) and RKL 11 (107.60) were found significantly superior over the checks for pods per plant. While, only two genotypes RKL 37 (2.70) and RKL 300 (2.10) were found superior to the checks for number of seeds per pod. On the other hand, five genotypes for 100-seed weight and eight genotypes for yield per plant were significantly superior to the checks. Appearance of disease was optimum to evaluate disease reaction of the genotypes. Some of the genotypes showed moderate to high susceptibility reaction to root rot/wilt disease after 35 days and 110 days of sowing. Five genotypes were found resistant to root rot/wilt each at 35 and 110 days after sowing.

The general mean, range and estimates of different parameters of genetic variability were presented in Table 2. The phenotypic coefficient of variation (PCV) was maximum for number of pods per plant followed by yield per plant, fruiting branches per plant, 100-seed weight, plant height, and days to flowering, whereas days to maturity and number of seeds per pod had low estimates of PCV. Similar trend was observed for genotypic coefficient of variation (GCV) for almost all the traits, though they were slightly low compared to PCV. The heritability estimate was the highest for days to 50 % flowering (99.19 %), followed by 100-seed weight, days to maturity and plant height. Number of pods per plant and number of seeds per pod had showed moderate heritability, whereas number of fruiting branches per plant and yield per plant showed low estimates of heritability.

seed weight (g), seed yield per plant (g), incidence of root rot/wilt % at 35 days after sowing and at 110 days after sowing. The observations on days to 50 % flowering and days to maturity were recorded on plot basis. Genotypic and phenotypic coefficient of correlation was computed according to (Jibouri *et al.*, 1958). The correlations were further partitioned into direct and indirect effects as suggested (Dewey and Lu, 1959).

The highest genetic advance was observed for number of pods per plant followed by days to 50 % flowering, plant height and days to maturity, whereas number of fruiting branches per plant, number of seeds per pod, 100-seed weight and yield per plant showed low estimates of genetic advance.

Genotypic and phenotypic correlation coefficients among different traits are presented in Table 3. Seed yield had significant positive genotypic correlation with all the yield contributing traits, whereas number of fruiting branches per plant and pods per plant showed significant positive phenotypic correlation with seed yield. Days to 50 % flowering showed significant positive correlation with days to maturity, 100-seed weight, number of fruiting branches per plant and pods per plant. Days to maturity exhibited significant positive correlation with 100- seed weight, plant height, number of fruiting branches per plant and pods per plant. Plant height was positively associated with branches per plant which in turn was positively associated with number of pods per plant. Number of pods per plant was positively correlated with number of seeds per pod.

The results obtained from path analysis on genotypic levels taking seed yield as dependent and other characters as independent variables are presented in Table 4. Pods per plant exhibited the highest positive direct effect (0.90) towards seed yield followed by 100-seed weight, plant height and days to maturity. The direct effect of number of branches per plant was negative. All the characters showed negative indirect effect on seed yield *via* number of branches per plant while the branches per plant showed highest positive indirect effect *via* number of pods per plant. The indirect effect of all the major yield contributing characters (days to 50 % flowering, days to maturity, number of seeds per pod) *via* number of pods per plant were high and positive. Low value of residual effect indicated high contribution of component traits studied towards seed yield.

Table 1. Superior lentil genotypes in comparison to check DPL 62 and JL 3 for different traits

S. No.	Characters	Test genotypes	DPL 62 (check)	JL 3 (check)
1	Days to 50 % flowering	RKL 03 (64.00), RKL 001(63.50), RKL 44, RKL 45 (56.00), RKL 48 (55.00), RKL 46, RKL 303 (56.50); RKL 311 (57.00)	79.00	68.00
2	Days to maturity	RKL 23, RKL 305 (113.50); RKL 34 (112.50); RKL 44, RKL 45, RKL 48, RKL 302, RKL 303, RKL 311 (112.00)	118.00	117.00
3	Plant height(cm)	RKL 308 (58.4);RKL 306 (59.5); RKL 301 (59.80); RKL (58.70)	57.70	65.00
4	No. fruiting branches/plant	RKL 310 (6.30); RKL 306, RKL 11 (6.10); RKL 300, RKL 43, RKL 41(6.00); RKL 23 (6.70); RKL 15 (6.40)	6.80	5.85
5	No. of pods per plant	RKL 308 (119.90); RKL 310 (117.20); RKL 11 (107.60); RKL 14 (123.20)	99.30	69.50
6	No. seeds /pod	RKL 37 (2.70); RKL 300 (2.10)	2.00	2.00
7	100-seed wt(g)	RKL 08 (3.44); RKL 14 (3.45); RKL 300 (3.49); RKL 306, RKL 310(3.34)	3.37	2.55
8	Yield per plant(g)	RKL 11 (7.11); RKL 14 (5.80), RKL 23 (5.96); RKL 47 (6.42); RKL 300 (8.44); RKL 306 (6.08); RKL 308 (6.34); RKL 310 (7.78)	5.01	4.61
9	Root rot/wilt (in % after 35 days of sowing)	RKL 26; RKL 302; RKL 46; RKL 308; RKL 311	resistant	2.50
10	Root rot/wilt (in % after 110 days of sowing)	RKL 27; RKL 26; RKL 42; RKL 302; RKL 307	resistant	5.00

Table 2. Genetic variability for yield and its component traits in indigenous germplasm of lentil.

Characters	Mean	Range	GCV (%)	PCV (%)	h <sup>2</sup> (%)	Genetic Advance as per cent of mean
Days to flowering	70.35	55-85	12.40	12.45	99.19	17.90
Days to maturity	116.38	112-121	2.03	2.18	87.11	4.55
Plant height (cm)	48.74	38.80-65	11.36	12.46	83.13	10.40
Branches/plant	4.96	3-6.70	13.29	21.08	39.77	0.86
No. of pods per plant	88.24	39.20-214.70	31.70	36.27	76.40	50.37
No. seeds /pod	1.89	1.40-2.70	8.00	9.60	69.41	0.26
100-seed wt (g)	2.54	1.90-3.49	18.11	18.44	96.43	0.93
Yield per plant (g)	4.43	2.72-8.44	18.03	33.74	28.55	0.88

Table 3. Phenotypic (P) and genotypic (G) correlation coefficients in germplasm of lentil

Character		Days to maturity	Plant height (cm)	Fruiting branches per plant	No. of pods per plant	No. seeds /pod	100-seed wt (g)	Yield per plant (g)
Days to 50% flowering	G	0.64**	0.20	0.34**	0.27*	0.02	0.36**	0.41**
	P	0.60**	0.19	0.22	0.23	0.02	0.36**	0.22
Days to maturity	G		0.29*	0.30*	0.29*	0.06	0.45**	0.55**
	P		0.24	0.18	0.22	0.10	0.41**	0.25
Plant height (cm)	G			0.32*	0.13	0.12	0.22	0.42**
	P			0.21	0.10	0.07	0.19	0.19
Fruiting branches per plant	G				0.60**	0.16	0.19	0.46**
	P				0.58**	0.12	0.14	0.63**
No. of pods per plant	G					0.32*	0.05	0.84**
	P					0.24	0.05	0.74**
No. seeds /pod	G						-0.15	0.28*
	P						-0.13	0.18
100-seed wt (g)	G							0.42**
	P							0.24

\*, \*\* Significant at 5 and 1 per cent level of significance, respectively

Table 4. Direct (in bold) and indirect effects of different component characters at genotypic level on seed yield.

Character	Days to 50 % flowering	Days to maturity	Plant height (cm)	Fruiting branches/ plant	No. of pods per plant	No. seeds per pod	100-seed wt(g)	Correlation with seed yield
Days to 50 % flowering	<b>0.00</b>	0.09	0.06	-0.09	0.24	0.00	0.11	0.41**
Days to maturity	0.00	<b>0.14</b>	0.08	-0.08	0.26	0.00	0.14	0.55**
Plant height (cm)	0.00	0.04	<b>0.28</b>	-0.09	0.12	0.00	0.07	0.42**
Branches/plant	0.00	0.04	0.09	<b>-0.28</b>	0.54	0.00	0.06	0.46**
Pods per plant	0.00	0.04	0.04	-0.16	<b>0.90</b>	0.01	0.02	0.84**
No. seeds per pod	0.00	0.01	0.03	-0.04	0.29	<b>0.03</b>	-0.04	0.28*
100-seed wt (g)	0.00	0.06	0.06	-0.05	0.05	-0.00	<b>0.31</b>	0.42**

Residual = 0.1857, \*, \*\* Significant at 5 and 1 per cent level of significance, respectively

#### 4. Discussion:

The estimates of different genetic variability parameters revealed that sufficient variability was present in the collected germplasm for days to flowering, plant height, number of fruiting branches per plant, pods per plant, 100-seed weight and yield per plant. This variability can be utilized effectively to develop high yielding early maturing cultivars through hybridization followed by selection. Genotype RKL 23 had better yielding ability (5.96 g/plant) along with early maturity (113.5 days) as

compared to checks. Besides this, RKL 48, RKL 44 and RKL 45 were also early in flowering (55.00 days) and maturity (122.00 days) as compared to check varieties. RKL 11 (7.11 g); RKL 310 (7.78 g), and RKL 308 (6.34 g) have good yield potential.. These genotypes were also promising in other yield attributing traits such as number of fruiting branches per plant, number of pods per plant etc. (Table 1). Utilization of these promising genotypes in breeding programme can be helpful in development of short duration varieties, The PCV estimates were higher

than their corresponding GCV for all the traits, however, the difference between the two was narrow for almost all the traits except seed yield per plant and number of branches per plant indicating that most of the characters were comparatively stable to environmental variation (Table 2). These results were in conformity with the findings of Rao and Yadav (1995) and Singh *et al.*, (2009).

Although GCV is an indicative of the presence of high degree of genetic variation, the amount of heritable portion of variation can be determined with the help of heritability estimates coupled with genetic advance. In the present study, days to flowering, 100-seed weight, days to maturity and plant height showed very high heritability. This suggests that selection for these traits may respond high to breed ideal genotypes in lentil. The high value of broad sense heritability may be due to additive gene effects, reports are also there in lentil to support the similar findings of Vir and Gupta, (1998) and Singh *et al.*, (2009). Though high heritability indicates the effectiveness of selection on the basis of phenotypic performance, it does not show any indication of the amount of genetic progress for selecting the best individuals. Therefore, heritability in conjunction with genetic gain is more useful than heritability alone in predicting the resultant effect for selecting the best genotype for a given trait. In the present study, high heritability estimates coupled with high genetic advance (Table 2) were observed for number of pods per plant, days to flowering and plant height indicating that these traits were under the additive genetic control and simple selection can be used for further improvement of these traits.

The genotypic correlations were generally higher than phenotypic correlation coefficients, which indicated the inherent relationship among the characters and masking effects of environments on the genotypic correlations. Seed yield was associated positively with all the yield attributing traits studied (Table 3). Yadav *et al.*, (2003) and Singh *et al.*, (2009) also reported positive association of seed yield with pods per plant. While making indirect selection for grain yield based on the correlated response, appropriate design and statistical tools should be used to reduce confounding effect of environmental factors and their interaction with genotypes in lentil. The path analysis results indicated that number of pods per plant, 100-seed weight, plant height, days to maturity and number of seeds per pod was important yield contributing characters (Table 4). The positive contribution of days to maturity indicates that our selection criteria should be focused on long reproductive phase to improve yield.

## 5. Conclusion

On the basis of correlation and path analysis studies, it can be concluded that number of pods per plant and 100-seed weight exerted high direct influence on seed yield per plant resulting in strong positive correlation and this should be taken into consideration while selecting desirable genotypes for higher seed yield in lentil. Since lentil is mostly grown under the receding moisture conditions during *rabi* season, earliness along with high biomass through rapid dry matter accumulation in pods should also be taken into account in selection process.

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## References :

- [1] Al. jibouri, Millar HA, Robinsen PA, HF. Genotypic and environmental variance and covariance in an upland cotton crop of interspecific origin. *Agron J.* 1958 50: 633-36.
- [2] Dewey DR, Lu KH. A correlation and path coefficient analysis of components of crested wheat grass production. *Agron J.* 1959 51: 515-18.
- [3] Rao SK, Yadav SP. Genetic analysis of biological yield, harvest index and seed yield in lentil. *Agricultural Science Digest Karnal.* 1995 15: 227-30.
- [4] Singh B B. Project Coordinator's Report. All India Coordinated Research Project on MULLaRP (Rabi), 2009 pp 15.
- [5] Singh S, Singh I, Gill RK, Kumar S, Sarkar A. Genetic studies for yield and component characters in large seeded exotic lines of lentil. *Journal of Food legumes.* 2009 22 (4); 229-232.
- [6] Vir O, Gupta VP. Variation in macrosperma X microsperma derived gene pool of lentil

under low and high fertility levels of soil in sub-tropical climate of Himalayas. Indian Journal of Agricultural Research.1998 32: 181-84.

[7] Yadav SS, Phogat DS, Solanki IS, Tomar YS. Character association and path coefficient analysis in lentil. Indian Journal of Pulses research. 2003 16: 22-24.

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## The role of villagers in Participatory Rural Appraisal (PRA)

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**Abstract:** The aim of PRA is to help strengthen the capacity of villagers to plan, make decisions, and to take action towards improving their own situation. Participatory Rural Appraisal (PRA) is considered one of the popular and effective approaches to gather information in rural areas. This approach was developed in early 1990s with considerable shift in paradigm from top-down to bottom-up approach, and from blueprint to the learning process. In fact, it is a shift from extractive survey questionnaires to experience sharing by local people. Much of the spread of participatory rural appraisal (PRA) as an emerging family of approaches and methods has been lateral, South-South, through experiential learning and changes in behavior, with different local applications. Rapid spread has made quality assurance a concern, with dangers from “instant fashion”, rushing, formalism and ruts. Promising potentials include farmers’ own farming systems research, alternatives to questionnaire surveys, monitoring, evaluation and lateral spread by local people, empowerment of the poorer and weaker, and policy review. Changes in personal behavior and attitudes, and in organizational cultures, are implied.

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**Keywords:** Participatory Rural Appraisal (PRA), participation

### Introduction:

In the context of rural development, information regarding the communities, their livelihoods, their beliefs, the physical environment in which they live, and their resource endowments need to be gathered and interpreted in a manner that identifies their priorities with a view of developing better understanding of their status and designing appropriate intervention projects directed at resolving their problems. The different ways of data collection and interpretation can be seen under two perspectives (IUCN, 2001): qualitative versus quantitative, and participatory versus top down. While the quantitative methods generate information that can be captured numerically, the qualitative methods generally do not generate specific numbers. Qualitative methods are concerned with exploring meanings, processes, reasons, and explanations (Inglis, 1992).

RRA was criticized for being extractive and highly dependent on expert interpretation. It was thus found useful to replace it with PRA which involves a process of learning from, with and by rural people about rural conditions. PRA shares much with its parent, RRA, but is distinguished from it in practice by correcting two common errors: roles of investigation are reversed; and rushing is replaced by relaxation and rapport. At the heart of all these developments was Robert Chambers, although Paulo Friere has also had strong influence especially in similar developments in education circles (Provention Concertium).

### five key principles that form the basis of any PRA activity:

#### 1. PARTICIPATION :

PRA relies heavily on participation by the communities, as the method is designed to enable local people to be involved, not only as sources of information, but as partners with the PRA team in gathering and analyzing the information.

#### 2. FLEXIBILITY :

The combination of techniques that is appropriate in a particular development context will be determined by such variables as the size and skill mix of the PRA team, the time and resources available, and the topic and location of the work (Dunn, 1991).

#### 3. TEAMWORK :

Generally, a PRA is best conducted by a local team (speaking the local languages) with a few outsiders present, a significant representation of women, and a mix of sector specialists and social scientists, according to the topic.

#### 4. OPTIMAL IGNORANCE :

To be efficient in terms of both time and money, PRA work intends to gather just enough information to make the necessary recommendations and decisions.

#### 5. SYSTEMATIC :

As PRA-generated data is seldom conducive to statistical analysis (given its largely qualitative nature and relatively small sample size), alternative ways have been developed to ensure the validity and reliability of



the findings. These include sampling based on approximate stratification of the community by geographic location or relative wealth, and cross-checking, that is using a number of techniques to investigate views on a single topic (including through a final community meeting to discuss the findings and correct inconsistencies).

**PRA techniques**(Gibson, 1992):

The most common methods are the following:

1- Diagramming, Mapping and Modeling:

- transects
- maps (resource, social, farm)
- venn diagrams
- seasonally analysis
- historical analysis (time lines, trend lines, activity profiles)

2- Ranking and scoring

- pair wise ranking
- matrix ranking
- matrix scoring
- well-being analysis and wealth ranking
- proportional piling
- pie charts (injera charts)

3- Problem analysis

- identification and specification
- causal chaining
- prioritization

PRA has evolved and spread from beginnings in Ethiopia, India, Kenya, Sudan and elsewhere, and in early 1994 is known to be being quite widely practiced in parts of Bangladesh, Botswana, Ethiopia, francophone West Africa, India, Indonesia, Kenya, Nepal, Nigeria, Pakistan, the Philippines, Sri Lanka, Sudan, Uganda, Vietnam, and Zimbabwe, while starts have been made in at least a score of other countries in Latin America, Africa and Asia. Hundreds of nongovernment organizations (NGOs) have adopted PRA and developed applications, as have a number of government departments. The use of PRA methods is being increasingly explored by students and faculty in universities for research, and by training institutes for fieldwork. Spread appears to be accelerating.

**PRA are good for:**

- Providing basic information in situations where little is known
- Identifying and assessing problems
- Appraising, designing, implementing, monitoring, and evaluation programs and projects
- Getting a better picture of needs and organizations' ability to meet them
- Developing and transferring appropriate technologies
- Appraising emergencies
- Planning projects that are more relevant, restructuring administrations, assisting in decision-making and policy formation

- Generating hypotheses, ruling out inappropriate ones
- Providing guidelines for survey designs and assessing the applicability of their results to other places.
- Fleshing – out complementing, interpreting, or giving depth and context to information obtained through other methods.

**PRA is not very useful for:**

Working in situations in which the problem is not usefully addressed at the local or group level, for example, in situations where large-scale structural reorganization is necessary (but even then, local views may help to shape the change).

**The objectives of the PRA are:**

- to enable rural people to organize their knowledge, share experience among themselves and gather information on resources they have
- to understand the rural environments and social as well as economic dynamism
- to understand the trends in the rural socio economic conditions
- to enable the community identify their problems, causes of these problems and possible solutions
- to enable the community develop a community action plan to address their problems

In order to limit the PRA to the objectives set and to have consistency in conducting the PRA in the different villages, a PRA manual was prepared by the socio economic team. In line with the manual, emphasis was accorded to the following topics:

- 1) Village History. The first day of the PRA discussion begins with history of the village which enabled participants to easily and comfortably tell about the history of their village.
- 2) Agriculture and Livestock. Focus group discussions were made on agriculture and livestock rearing practices including the problems encountered and possible solutions.
- 3) Social service. The provision of social services like education and health including the associated problems were also discussed in focus group discussions.
- 4) Village institutions. Institutions, both from within the village and outside, as well as formal and informal with which the rural communities interact have been addressed.
- 5) Trend lines. Trends in food availability, forest, population growth, wealth, rainfall and poverty are addressed in this section.
- 6) Wealth ranking, problem analysis, and community action plan. Finally, the participants ranked the community on the basis of its wealth, discussed the major problems and formulated action plan. The PRA is to be followed with a more quantitative and structured socioeconomic survey, which will then be followed by specialized researches in specifically selected areas; notably, poverty and coping mechanisms, microfinance,

marketing, utilization and management of natural resources, and gender.

At the end of the 1980s, Participatory Rural Appraisal was developed in response to the too mechanistic and extractive implementation of RRAs. In PRAs the target group is encouraged to learn and the role of outsiders is reduced to a facilitator of the learning process. PRA aims to empower local people by encouraging them to share, enhance and analyse their knowledge of life and conditions and to plan, act, monitor and evaluate.

As with RRA it is hard to define what exactly a PRA is (some even prefer not to define it and just refer to “a family of approaches”). PRA shares the basic principles of RRA (quick, multidisciplinary, observations, etc.), yet now it is the local people who are encouraged to analyse their own situation and plan activities to improve it. The three basic pillars of PRA (and the basic differences from RRA) are:

1. the behaviour and attitude of outsiders, who facilitate rather than dominate;
2. the methods, which are open, group-oriented, visual and comparative;
3. sharing of information, food, experiences, etc. between in- and outsiders.

For the tools used, two issues stand out:

1. ‘Handing over the stick’: instead of outsiders trying to understand the knowledge of the local people, PRA tries to facilitate local people to develop their capabilities. They collect and analyse the data and propose actions to be undertaken.
2. Visualisation and sharing: local people convey their ideas and knowledge in a visual way. In verbal communication, outsiders dominate the dialogue more easily (via eye contact, cross-checking, etc.) than in communication via visual aids. When a map is drawn by a stick in the soil all can contribute, and local people feel more confident than when outsiders try to draw a map on a piece of paper with a pen - a typical tool of powerful outsiders. Sharing also explicitly involves the food and shelter during the PRA.

The most commonly used tools are:

- participatory mapping: a group of villagers makes a map of the community. The way they do this and what they find important provide good entry points for discussions about crucial aspects of village life;
- village transects: together with a (small) group of villagers the team walks through the village (or another relevant area) and discusses the things observed;
- ranking: people are asked to compare units (e.g. families /trees /crops) and to group them according to their own criteria. For example, via pair-wise comparing the importance of certain trees, people find out which criteria they use to assess the usefulness of these. Ranking is also used to stratify the local population, e.g. via wealth ranking. Both the results of the ranking and the criteria used provide entry

points for further discussions.

- historical recalls: the lifestory of families are recalled and the main events are used as reference points in the analysis of the present situation;

- calendars: people indicate how things change over time, e.g. in which months they have to borrow money, when their children get malaria, when the rains are normally expected, etc.

Combining information obtained from all the tools provides the villagers with an explicit picture of their daily life. This not only helps them to start a discussion on their main problems and how to tackle them, it also boosts their self-esteem because they are able to make this analysis themselves.

### Conclusion:

Kamla Bhasin (1999) suggests that development practitioners should constantly ask themselves: “am I increasing the confidence of the poor, their faith in themselves, and their self – reliance, or am I making them instruments of my own plans of action, imposing my own ideas on them and that of my organization and/or institution?” Social Development is a process of gradual change in which people increase their awareness of their own capabilities and common interests, and use this knowledge to analyse their needs; decide on solutions; organize themselves for cooperative efforts; and mobilize their own human, financial and natural resources to improve, establish and maintain their own social services and institutions within the context of their own culture and their own political system. To give effect to this understanding of social development, participation of communities in their own development is important. The participatory approaches, including PRA provides first step/stage in sustainable community development.

As a result of the PRAs, the communities are expected to attain many benefits including:

- Expressing their own ideas and concerns;
- Organizing their knowledge about the past and present;
- Identifying as a community their problems, the causes of these problems and possible solutions;
- Developing a common plan to address these problems;
- Developing the ability to use their own resources more effectively and attract more resources from the outside.

The academicians/researchers involved in the PRAs are expected to get the following benefits:

- Developing better understanding of rural environments and social as well as economic dynamism taking place there;
- Appreciating the fact that communities are capable of analyzing their problems

and outlining possible solutions to their problems;

- Participating in designing possible solutions to community problems;
- Utilizing the results of the PRA work as a research output for publications and presentations;
- Building their research and problem investigation capabilities;
- Supporting their classroom discussions to students with practical examples from the PRA findings.

The main objectives of the current PRA are:

1. empowerment of rural communities by assisting them to systematically utilize their local knowledge to identify problems and strengths, develop skills of analysis, and design appropriate mechanisms for intervention by themselves and/or by development agents;
2. advancement of understanding by academicians/researchers of local knowledge and acknowledgement of the capacity of communities to gather data, conduct analysis, and identify as well as prioritize problems and solutions;
3. utilization of the research questions/problems identified during the PRAs for further investigation;
4. documenting and presenting the outcomes of the PRAs to development agents (governmental and non-governmental) and other stakeholders so that they could undertake interventions in line with the findings.

PRA consists of a series of participatory exercises which help community members better assess their history, resources, and overall situation as concerns agriculture, health, marketing, credit, coping mechanisms, education, and other important areas.

During the conduct of the PRAs, rural communities in the selected villages will gather information on the resources they already possess; organize their knowledge; share experience among themselves; learn from each other; identify and prioritize local development needs; and develop action plans which respond to these needs.

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**References:**

1. Appleyard, B., *Understanding the Present: Science and the Soul of Modern Man* (London: Picador, published by Pan Books, 1998).
2. Chambers, Robert, "Methods for analysis by farmers: The professional challenge," *Journal for Farming Systems Research Extension*, Vol. 4, No. 1 (1994). pp. 87- 101.
3. Chambers Robert, *Notes for Participants in PRA/PLA Familiarization Workshop in 2004*.
4. Clayton, A., P. Oakley and B. Pratt. *Empowering People - A Guide to Participation*. UNDP, 1997.
5. Cornwall, A. *Making a difference? Gender and participatory development*. IDS discussion paper 378, 2008.
6. Drummond, and Nontokozi Nabane, "The use of indigenous trees in Mhondoro District" (Harare: Centre for Applied Social Sciences, June 1992).
7. Dunn, A. M., "New challenges for extensionists: Targeting complex problems and issues," Paper for the 10<sup>th</sup> European Seminar on Extension Education, Universidade de Tras-os-Montese Alto Douro (Vila Real, Portugal: September 1991).
8. Ekins, P., *Wealth Beyond Measure: An Atlas of New Economics* (London: Gaia Books, 1992).
9. Gibson, Tony, "Planning for real: The approach of the Neighbourhood Initiatives Foundation in the UK," *RRA Notes*, No. 11 (1991) pp. 29-30.
10. Hahn, H., *Apprendre avec les yeux, s'exprimer avec les mains: des paysans se familiarisent avec la gestion du terroir* (Switzerland: AGRECOL. Oekocentrum, Langenbruck, 1991).
11. Holland, J. and J. Blackburn. (eds). *Whose voice? Participatory research and policy change*, London, UK. IT Publications, 1998.
12. Inglis, Andrew Stewart. "Harvesting local forestry knowledge: A field test and evaluation of rapid rural appraisal techniques for social forestry project analysis," Dissertation presented for the degree of Master of Science (Edinburgh: University of Edinburgh, 1990).
13. IUCN. *Seek... and Ye Shall Find: Participatory Appraisals with a Gender Equity Perspective*. Module 2 of the ORMA modules towards Equity, 2001.
14. KGVK. *Mancrjemrnf Training Mnnuul* (Bihar, India: Krishi Gram Vikas Kendra, Ranchi, Bihar, 1991).
15. Mukherjee, Neela, "Villagers' perceptions of rural poverty through the mapping methods of PRA," *RRA Notes*, No. IS ( 1992). pp. 2 1-26.
16. NCAER. *Comparatil'e Study of Sample Survey and Prrrticipatotyv Rurtrl Apprnisul Methodologies* (New Delhi: National Council for Applied Economic Research, II Indraprastha Estate. November 1993).
17. Pretty. Jules N., "Participatory inquiry and agricultural research" (London: BED, 1993).
18. Scoones. Ian. and John Thompson, "Challenging the Populist Perspecti\~e: Rurcd People's Knor~'ledge. *Agricultural Research and*

E, uensio, l Practice. " Discussion Paper 332 (Brighton: IDS. University of Sussex. December 1993).

19. Scrimshaw, Nevin S., and Gary R. Gleason (Ed.), RAP Rapid Assessment Procedures: Qualitative Methodologies for Planning and Evaluation of Health Related Programmes (Boston MA: International Nutrition Foundation for Developing Countries, 1992).

20. Swift, Jeremy, and Abdi Noor Umar, Participatory Development in Isiolo District: Socio-economic Research in the Isiolo Livestock Development Project (Isiolo, Kenya: Isiolo Livestock Development Project, EMI ASAL Programme. 1991).

21. Uphoff, Norman, Learning from GRI: Possibilities in Participatory Development and Post-Newtonian Social Science (Ithaca: Cornell University Press, 1992).

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## A Comparative Study of Performance of Mechanical Engineering Students in Selected Basic Engineering Courses at Ladoke Akintola University of Technology, Ogbomosho

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**Abstract:** The importance of engineering in nation development cannot be overemphasized. This is because, the prosperity and economic well being of any country have direct link with technological knowhow of such a country. Hence, adequate and in-depth knowledge of basic engineering courses are required to become a successful engineer. This study was carried out to compare the performance of mechanical engineering students in selected basic engineering courses at Ladoke Akintola University of Technology, Ogbomosho. Secondary data in form of the results or scores for the past five years were collected from the examination officer of the department, through the permission of the head of department. Essentially, cumulative grade point average (CGPA) of the students was used. Data were analyzed using means and standard deviations at 95 % confidence level. Data were further subjected to Anova-tests. The trends of performance of students based on courses and years of study were also investigated. The mean scores of 3.26, 3.48, 3.10, 2.84, 3.175 and 2.24 were obtained for the period of five years in the six selected courses in the harmattan semester, while the mean scores in the rain semester were 3.16, 3.02, 2.50, 3.28, 2.84 and 2.98. Statistics revealed that there were no significant differences in the performance of students in the selected courses as well as the trend of performance over the studied years in harmattan semesters. The study concluded that, there were no significant differences in the performance of students in the selected courses in both harmattan and rain semesters. While there is no significant difference in the trend of performance over the studied years in the harmattan semesters, there was significant difference in the trend of performance of students over the years in rain semesters.

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### 1. Introduction

Engineering is one of major disciplines in most worlds' universities and higher institutions of learning, Nigeria inclusive. In Nigeria, the importance of engineering was underscored with the fact that many universities were established solely as universities of Technology. This is so because; it is mainly on technology that the prosperity of Nigeria

depends. Good technology will also boost our agriculture, and this will guarantee the production of food for the growing population, the generation of employment and the foreign exchange earnings (Anyanwu et al., 1998).

Engineering as a discipline, has many branches. Notable among them are mechanical, civil, electrical, chemical, agricultural, computer engineering and so on (Khurmi and Gupta, 2006). There are compulsory

and basic courses for all students offering mechanical engineering as a discipline. A student cannot become a successful mechanical engineer without adequate and in-depth knowledge of these courses (Sharma and Aggarwal, 2006). Engineering as a discipline, mechanical engineering inclusive, is faced with many difficulties in Nigerian higher institutions. One of the difficulties being faced by engineering students is lack of exposure to practical, as most students find it difficult to secure places for student industrial work scheme (Adebiyi and Oladeji, 2009). The compulsory National Youth Service Scheme does not help matter as most of graduate engineers are sent to secondary schools to teach. Poor knowledge in allied subjects such as technical drawing, mathematics and space geometry at secondary level also contributes in no small measure to poor performance of students in mechanical engineering courses (Adebiyi and Oladeji, 2009).

The main objective of this study was to investigate and compare the performance of students in selected and basic mechanical engineering courses, which are MEE 201- Engineering Drawing I, MEE 203-Workshop Technology I, MEEE 205-Engineering Materials I, MEE 207- Fluid Mechanics I, MEE 211- Engineering Thermodynamics I and MEE 213- Engineering Mechanics I for harmattan semester, and MEE 202- Engineering Drawing II, MEE 204- Workshop Technology II, MEE 206-Engineering Mechanics II, MEE 208- Engineering Materials II, MEE 212- Engineering Materials II and MEE 214- Strength of Materials for rain semester. The study went further to investigate the trend of performance of students based only on courses and years of study in both harmattan and rain semesters.

## 2. Materials and Methods

This study was conducted among the mechanical engineering students of Ladoke Akintola University of Technology, Ogbomoso (LAUTECH). LAUTECH is located in Ogbomoso and was established in 1990. The university was jointly owned by Oyo and Osun States in the south-west geo-political zone of the country and was best state university in Nigeria for four consecutive years. The university has a population of about twenty six thousand and it is heterogeneously inhabited by many Nigerian tribes namely: Yoruba, Ibo, Hausa, and other minority

tribes. The university has six faculties and the main religions practised within the university are Christianity and Islam.

For the purpose of this study, the descriptive method of survey was used. Secondary data in form of the results or scores for the past five years were collected from the examination officer of mechanical engineering department through the permission of the head of department. Data were analysed using means and standard deviations at 95 % confidence level. Data were further subjected to Anova tests. The method was used because it is considered to be the most appropriate method of comparing means of many groups, which are subjected to the same conditions (Ogunleye, 2009; Oladeji, 2011). The trends of performance of students based on courses and years of study were also investigated. All the statistical analyses were performed on a micro-computer using SPSS 11.0 (Statistical Package for Social Science, 2002).

## 3. Results

The results of performance of students in all the six courses examined over the period of five years for both harmattan and rain semesters were presented in Tables 1 and 2, while Figures 1 and 2 depict comparison in the performance of students in harmattan and rain semesters respectively.

Table 1: Mean scores in selected courses in harmattan semesters

Academic Year	Courses					
	MEE 201	MEE 203	MEE 205	MEE 207	MEE 211	MEE 213
2005/2006	2.20	3.40	3.30	2.20	3.20	2.40
2006/2007	3.70	4.10	3.00	2.60	2.10	1.10
2007/2008	2.70	3.70	3.30	3.70	2.50	2.80
2008/2009	3.60	2.80	3.30	3.60	3.10	2.80
2009/2010	4.10	3.40	2.60	2.10	2.30	2.10
<b>Mean</b>	<b>3.26</b>	<b>3.48</b>	<b>3.10</b>	<b>2.84</b>	<b>2.64</b>	<b>2.24</b>

Table 2: Mean scores in selected courses in rain semesters

Academic Year	Courses					
	MEE 202	MEE 204	MEE 206	MEE 208	MEE 212	MEE 214
2005/2006	2.50	2.90	2.50	2.30	2.50	1.60
2006/2007	3.00	2.50	2.60	3.20	3.00	2.90
2007/2008	2.70	3.30	1.80	3.40	2.10	3.20
2008/2009	4.00	3.00	3.20	4.10	3.70	4.20
2009/2010	3.60	3.40	2.40	3.40	2.90	3.00
<b>Mean</b>	<b>3.16</b>	<b>3.02</b>	<b>2.50</b>	<b>3.28</b>	<b>2.84</b>	<b>2.98</b>

From Table 5, for the period of five years examined in the harmattan semesters, the students had the best performance in MEE 203 with a mean score of 3.48, which was strictly followed by MEE 201 with a mean score of 3.26, while the lowest performance was in MEE 213 with a mean score of 2.24, which was followed by MEE 211 with a mean score of 2.64. In the rain semesters, the best performance was recorded in MEE 208 with a mean score of 3.28, which was followed by MEE 201 with a mean score of 3.16, while the lowest performance was in MEE 206 with a mean score of 2.50. The poor performance of students in courses such as MEE 211, MEE 213

and MEE 206 was not unexpected, as all these courses are mathematics based courses and as noted by Adebisi and Oladeji (2009), poor knowledge in allied subjects such as technical drawing, mathematics and space geometry at secondary level also contributes in no small measure to poor performance of students in mechanical engineering courses.

The mean scores shown in Tables 1-2 were further subjected to Anova tests and the results were presented in Tables 3 and 4 for harmattan and rain semesters respectively.

Table 3: Performance of students in the harmattan semesters at 5%

ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Years	1.095333	4	0.273833	0.69319	0.605371	2.866081
Courses	5.042667	5	1.008533	2.553033	0.060774	2.710891
Error	7.900667	20	0.395033			
Total	14.03867	29				

Table 4: Performance of students in the rain semesters at 5%

ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Years	5.774667	4	1.436167	7.396567	0.000794	2.866081
Courses	1.861667	5	0.372333	1.917597	0.13625	2.710891
Error	3.883333	20	0.194167			
Total	11.48967	29				

From the results, it can be seen that there were no significant differences in the performance of students in the selected courses (F-calculated is less than F-critical i.e  $0.69319 < 2.866081$ ) as well as the trend of performance over the studied years (F-calculated is less than F-critical i.e  $2.5503 < 2.710891$ ) in the harmattan semesters (Table 3). However, in the rain semesters (Table 4), there was significant difference in the trend of performance of students over the years (F-calculated is higher than F-critical i.e  $7.396567 > 2.866081$ ), while there is no significant difference in the performance of students in the selected courses (F-calculated is less than F-critical i.e  $1.917597 < 2.710891$ ).

#### 4. Conclusions

Based on the results and findings of this study, the following conclusions can be drawn: -

- i. The study concluded that, there were no significant differences in the performance of students in the selected courses in both harmattan and rain semesters.
- ii. While there was no significant difference in the trend of performance over the studied years in the harmattan semesters, there was significant difference in the performance of students in the selected courses in the rain semesters.
- iii. Students were not at their best in mathematical related courses

#### References

- Adebisi, K.A., and Oladeji, J.T., (2009) Fundamentals of Engineering Drawing- A stepwise Approach, Series 2, Keller Prints Production, Ibadan pp 2-5
- Anyanwu, A.C., Anyanwu, B.O., and Anyanwu, V.A., (1998) A Textbook of Agricultural Sciences

- for Schools and Colleges, Africana-FEP Publishers Limited, 5<sup>th</sup> Edition, Onitsha
- Khurmi, R.S., and Gupta, J.K., (2006) A Textbook of Machine Design. Eurasia Publishing House (PVT) Ltd. Ram Nagar, New Delhi
- Ogunleye, O.O., (2009) "Optimizing Raw Materials Formulation for Flexible Polyurethane Foam Production" An Unpublished Ph.D Thesis in the Department of Industrial and Production Engineering. Faculty of Technology, University of Ibadan, Ibadan
- Oladeji, J.T., (2011) "The Effects of Some Processing Parameters on Physical and Combustion Characteristics of Corncob Briquettes" Unpublished Ph.D Thesis in the Department of Mechanical Engineering Faculty of Engineering and Technology, Ladoke Akintola University of Technology, Ogbomoso
- Sharma, P.C., and Aggarwal, D.K., (2006) Machine Design S.K. Kataria and Sons, Nai Sarak, Delhi

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## Assessing adult education in developing countries

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**Abstract:** in developed countries, adult education is a form of informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings. Concept of adult education in revolutionary countries, is a combination of these two concepts. Changes in these countries due to social, political and cultural revolution, resulting from, literacy and continuing education necessary to find because of the revolution, there is cultural poverty on the other hand the implementation of development plans and the need for skilled personnel are expert. General adult education system based on economic conditions - social and cultural community is different and each specific goals will follow. General objectives of adult education and literacy in two categories is divided into professional education.

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**Keywords:** adult education, developing countries

### Introduction:

Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education. Despite landmark reforms in public schools, too many Kentuckians continue to drop out of school, thereby perpetuating the chronic problem of adult illiteracy. Too many young Kentucky parents are unable to read and lack the basic literacy necessary to provide the necessary stimulating, supportive family environments for young children. It is known that children's literacy levels are strongly linked to the educational level of their parents and that children of parents who are unemployed and have not completed high school are five times more likely to drop out. Only the negative consequences are obvious: getting more education often means leaving one's family and community for jobs and opportunities for advancement somewhere else. The future of Kentucky depends on uplifting the quality of life and economy of all of Kentucky. The social and economic costs of neglect of large parts of the state will drag down the rest of the state and seriously hinder its capacity to compete in the global economy.

The field of adult education and literacy is plagued by confusion about definitions. Over the years definitions have evolved from provisions in federal law and initiatives of groups advocating particular methodologies or the needs of specific adult populations. The result is that definitions tend to merge statements about the goals to be achieved (e.g., improving the literacy of a particular population) with a

particular means (e.g., adult basic education) to achieve the goal adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge.

Several definitions of adult education has been done:

Adult Education is a] in the following examples are given of them. conscious effort by public institutions or voluntary organizations to promote community awareness comes action.

- adult education teaching is typically specific age group above the legal age] limits as formal and informal, voluntary and at different levels of time, place
- Adult Education is a process in which people who] and education is presented. somehow been cut course they consciously to change or advance their skills in information and do organized activities.
- Adult education includes all formal and informal training and volunteer after] school, which by experienced educators and aware of the system.

Educational materials on adult education with daily life,

needs, goals, aspirations and past experiences of adults and their relationship helps to results learned in life and career are used.

### What Is Adult Learning?

Adult learners have a different approach to learning. By the time you reach adulthood, you're most likely responsible for your own success and you're perfectly capable of making your own decisions once you have the information you need.

Adults learn best when learning is focused on them, not the teacher. This is called [andragogy](#), the process of helping adults learn.

Malcolm Knowles, a pioneer in the study of adult learning, observed that adults learn best when:

1. They understand why something is important to know or do.
2. They have the freedom to learn in their own way.
3. Learning is experiential
4. The time is right for them to learn.
5. The process is positive and encouraging.

Teaching adults can be very challenging, but also very rewarding. Most teachers would agree that the benefits derived from a successful adult education program in agriculture far outweigh the costs. In addition to the direct benefits to adult participants, the teacher, the school, the community, and the secondary program also benefit from a quality adult education program in agriculture.

Adults in agriculture use a number of sources to gain new information that can be used to help them solve problems. Persons employed in agriculture utilize newspapers, magazines, newsletters, radio, television, government publications, internet, and meetings to gather information which can be directly utilized in their business activities. In many communities, the agriculture teacher is the primary source of agricultural information.

Successful adult education programs develop and utilize an Agricultural Education Program Advisory Committee to assess the informational needs of adults in the community. Agriculture teachers should utilize the expertise and communications link, which an effective advisory committee provides. Specifically, the advisory committee should be asked to provide advice regarding planning, conducting, and evaluating the adult education program in agriculture.

Adult education programs in agriculture should emphasize practical application of the information

presented. Topics and information included in adult programs should be provided which fulfills needs of the local community. Providing information which cannot be applied to solve a local problem or address a local issue will generally be viewed as frivolous and over time will result in decreased interest (i.e. participation) in the adult education program.

### Comparison of adult education in various countries:

In developed countries, adult education is a form of informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings.

In developing countries and backward because the problems in primary education, lack of resources and facilities, poverty, social existence, economic and cultural concept of adult education is different. In such countries the concept of adult education, literacy education is.

Concept of adult education in revolutionary countries, is a combination of these two concepts. Changes in these countries due to social, political and cultural revolution, resulting from, literacy and continuing education necessary to find because of the revolution, there is cultural poverty on the other hand the implementation of development plans and the need for skilled personnel are expert. General adult education system based on economic conditions - social and cultural community is different and each specific goals will follow. General objectives of adult education and literacy in two categories is divided into professional education.

### Characteristics of adult education:

#### flexibility in time:

In the past, usually one of the obstacles in the way of learning and development of adult education was being inflexible and time courses were programs. But now most countries have to consider that the speed limit of time and learning ability and facilities must be adults. Flexibility in time means that not only should the time classes and programs for adults is appropriate, but necessary facilities should be provided for independent study.

#### Flexibility in the location:

One of the aspects of flexible space is that individuals can, regardless of their residence to the study and advancing their knowledge and skills pay. For example, adults in remote villages should like people who live in the city use of educational programs. After flexibility in other places is that the issue of specificity of location is not considered primarily educational.

#### Flexibility in age:

Educational opportunities for certain age should not use it for all regardless of their age, is possible. In fact, educational programs must use people of different ages to prepare.

#### **Flexibility in admission:**

No adult should not only be deprived of education because of the necessary conditions for admission in the class does. Of course this is not such a person without academic records to participate in university classes is accepted, Adoption order is that the adults in educational programs at different levels, according to the possibility of using the opportunity that is provided must be based on the experience and knowledge and their knowledge is.

#### **To combine education and job responsibilities:**

Adults should be able to work during that time engaged in training classes take them. In other words, their presence in the class should be considered part of their work. This means that low-literate or illiterate working people who are allowed to work an hour of your daily spending surpassed participation in educational programs.

#### **Quality, compensation, and support for teachers in adult education.**

As indicated earlier, a strength of adult education in Kentucky is the dedication of the many teachers often serving under difficult conditions, without adequate support, and often with compensation and benefits less than teachers in the public schools. Testimony before the task force characterized the work of adult educators as “missionary” work. Recognizing the seriousness of the adult literacy issue in Kentucky, it should be a major concern that the Commonwealth does not have a comprehensive approach to the professional preparation, development, and support of adult educators.

The challenge for Kentucky will be to move from a system that still depends on teachers with limited training in working with adults, to one in which professional competence in working with adults is a basic requirement. Any strategy to make this transition must involve both professional development and support for the teachers now in the field as well as a new system for a new generation of adult educators.

When the issue is examined from a county-by-county perspective, a significant mismatch is found between the availability of services and the target population. The problem is partially one of resources. Yet an even more serious problem is the lack of local leadership and coordination of available resources—both public and private. A deliberate strategy is needed to focus state priorities on the target population at the lowest literacy levels (Levels I and II) and in the counties with largest percentages of adults at these levels. Unless Kentucky

can narrow the disparities within the state, the Commonwealth will be unable to narrow the disparities in per capita income and other critical indicators between Kentucky and its competitor states.

#### **Conclusion:**

Material often set different types of materials and educational content in books and pamphlets, books, training guides, trainers, equipment auxiliary audio, visual and material are included such that during actual teaching sessions, are used in the transmission and content but also to achieve the goals of making education programs are important.

Additional material for the next stage of learning often means to be expected when developing your learning skills Learners to increase awareness and enjoyment of reading and studying to operate.

To improve the quality of life, learning materials should reinforce the skills they acquired previous. This material should have access to information and provide new technology. should also have to make learning more fun. Additional materials should provide opportunities for literacy skills to read and to strengthen their cognitive awareness.

Track materials (continued) which increased literacy skills and knowledge gained is also effective in enriching learning environment for learners are important. Participatory materials to ensure the participation of learners in the learning process and codification are included out of class activities, dialogue, role playing, etc.

In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them.

Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered.

Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his.

Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or

transfer is provided, develop knowledge, insight and skills they will.

To ensure that science curriculum and educational aspects, according to community needs and audiences, application form is provided or not, the content selection criteria should be considered. These criteria is being include knowledge, effectiveness, flexibility, diversity, relevance and practical learning

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**Reference:**

1. Birzea, C. (2001), The social impact of the continuous professional training. Bucharest, The National Romanian Observer.
2. Cranton, P. (1992). Working with Adult Learners. Toronto: Wall & Emerson.
3. Cranton, P. (1996). Professional Development as Transformative Learning. San Francisco: Jossey- Bass.
4. Creighton S. (2000). Participation trends and patterns in adult education: 1991-1999. United States: National Center for Education Statistics.
5. Egan, K. (1992). Imagination in Teaching and Learning. Chicago: University of Chicago Press.
6. Fabry, D. L., & Higgs, J. R. (1997). Barriers to the effective use of technology in education: Current status. Journal of Educational Computing Research, 17(4), 385-395.
7. Fletcher, W. E., & Deeds, J. P. (1994). Computer anxiety and other factors preventing computer use among United States secondary agricultural educators. Journal of Agricultural Education, 35(2), 16-21.
8. Frye, N. (1993). The Educated Imagination. Toronto: Canadian Broadcasting Corporation.
9. Glenn, A. D. (1997). Technology and the continuing education of classroom teachers. Peabody Journal of Education, 72(1), 122-128.
10. Habermas, Jurgen. (1991). Knowledge and Human Interests. Boston: Beacon Press.
11. Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate data analysis (5th ed.). Upper Saddle River, NJ: Prentice Hall.
12. Hanson, Karen. (1988). Prospects for the Good Life: Education and Perceptive Imagination. In K. Egan and D. Nadaner (Eds.), Imagination and Education. New York: Teachers College Press.
13. Hardy, Barbara. (1998). Towards a Poetics of Fiction: An Approach Through Narrative. Novel, 2, 5-14.
14. Hopey, C. (1999). Technology and adult education: Rising expectations. Adult Learning, 10(4), 26-29.
15. Isahak Haron & Doraisamy, J. (1992). Lifelong education in Malaysia: A general survey. Thesis Mas. UM. 10. 1-13. Kuala Lumpur: Universiti Malaya.
16. Kim K. (2000). Participation in adult education in the United States, 1998-1999. U.S. Dept. Of Education, Office of Educational Research and Improvement.
17. King, K. P. (1999). Unleashing technology in the classroom: What adult basic education teachers and organizations need to know. Adult Basic Education, 9(3), 162-175.
18. King, K. P. (2003). Learning the new technologies: Strategies for success. In K. P. King & P. Lawler (Eds.), New perspectives on designing and implementing professional development of teachers of adults. New directions for adult and continuing education (Vol. 98, pp. 49-57). San Francisco: Jossey-Bass.
19. Knowles, M. S. (1992). The modern practice of adult education, andragogy versus pedagogy. Author of the Classic Informal Adult Educator, 3rd Edn. New York: Association Press.
20. Knowles, M. S. (1994). Andragogy in action: Applying modern principles of adult learning. San Francisco: Jossey-Bass Inc. Pub.
21. Knowles, M. S. (1999). The making of adult educator: An autobiographical journey. 1st Edn. San Francisco: Jossey-Bass Inc. Pub.
22. Kolb, David A. (1993). Experiential learning: Experience as the source of learning and development. 1st Edn. United States: FT Press.
23. Kotrlík, J.W., & Smith, M. N. (1999). Computer anxiety levels of vocational agriculture and other vocational teachers. In M. F. Burnett (Ed.), Proceedings, national agricultural education research meeting (pp. 1-9). Columbus, OH: American Association for Agricultural Education.
24. Krajnc, A. (1999). Andragogy. In Collin, J. T. (Ed.), Lifelong education for adults: An international handbook. 1st Edn. New York: Pergamon Press.
25. Lang, J. M. (1998). Technology in adult basic and literacy education: A rationale and framework for planning (Research report). Cheney: Eastern Washington University, Instructional Media and Technology. Retrieved on November 14, 2003, from

- <http://cehd.ewu.edu/education/GraduateExamples/JML98Educ601.html>
26. Lawler, P. A., & King, K. P. (2003). Changes, challenges, and the future. In K. P. King & P. Lawler (Eds.), *New perspectives on designing and implementing professional development of teachers of adults*. *New directions for adult and continuing education* (Vol. 98, pp. 83-91). San Francisco: Jossey-Bass.
  27. Jaffee, L. L. (2001). Adult literacy programs and the use of technology. *Adult Basic Education*, 11(2), 109-124.
  28. Jordan, W. R., & Follman, J. M. (1993). Using technology to improve teaching and learning. *Hot topics: Usable research*. Palatka, FL: Northeast Florida Educational Consortium, Southeastern Regional Vision for Education. (ERIC Document Reproduction Service ED 355 930).
  29. Mazanah Muhamad & Associates. (2001). *Adult and continuing education in Malaysia*. 1st Edn. Kuala Lumpur: Universiti Putra Malaysia.
  30. Merriam, S.B., Baumgarther, L.M., & Caffarella, R.S. (1999). *Learning in adulthood: A comprehensive guide*. 2nd Edn. San Francisco: Jossey-Bass Pub.
  31. Mezirow, Jack and Associates (Eds.) (1990). *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Education*. San Francisco: Jossey-Bass.
  32. Moore, M. G., & Kearsley, G. (1996). *Distance education: As systems view*. Belmont, CA: Wadsworth.
  33. Office of Technology Assessment, U.S. Congress. (1993). *Adult literacy and new technologies: Tools for a lifetime* (Final Report No. OTA-SET-550). Washington, DC: Government Printing Office.
  34. Norzaini Azman. (2006). History, trends and significant development of adults education in Malaysia in *HISTORIA: Journal of Historical Studies*. Vol. VII, No. 2. Bandung: Historia Utama Press.
  35. Russell, A. (1995). Stages in learning new technology: Naive adult email users. *Computers and Technology*, 25(4), 173-178.
  36. Timmermann, S. (1998). The role of information technology in older adult learning. In J. C. Fisher & M. A. Wolf (Eds.), *Using learning to meet the challenges of older adults*. *New directions for adult and continuing education* (Vol. 77, pp. 61-71). San Francisco: Jossey-Bass.
  37. Sava, S. (2001). Adults' education in Romania: Educational, cultural and social politics. The volume of the first National Conference on Adults' Education, Timisoara, The Almanack of Banat Printing House.
  38. Schifirnet C. (1997). *Changing Adults' Education*. Bucharest, Fiat Lux Printing House.
  39. Sutton-Smith, Brian. (1988). In Search of the Imagination. In K. Egan and D. Nadaner (Eds.), *Imagination and Education*. New York, Teachers College Press.
  40. UNESCO. (1999). *The Hamburg Declaration. Fifth international conference on adult education (Confitea V)*. Paris: UNESCO
  41. Williams, Oscar. (Ed.) (1990). *A Little Treasury of Modern Poetry* (3rd Edition). New York: Charles Scribner's.

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## Comparison of adult education in various countries

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**Abstract:** in developed countries, adult education is a form of informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings. In developing countries and backward because the problems in primary education, lack of resources and facilities, poverty, social existence, economic and cultural concept of adult education is different. In such countries the concept of adult education, literacy education is.

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**Keywords:** adult education; adult; people

### Introduction:

The field of adult education and literacy is plagued by confusion about definitions. Over the years definitions have evolved from provisions in federal law and initiatives of groups advocating particular methodologies or the needs of specific adult populations. The result is that definitions tend to merge statements about the goals to be achieved (e.g., improving the literacy of a particular population) with a particular means (e.g., adult basic education) to achieve the goal.

Therefore, it is helpful to distinguish between at least these dimensions of the issue:

1. "Literacy" refers to the knowledge, skills, and competencies of individuals. The federal Adult Education and Family Literacy Act (Title II of the Workforce Investment Act)<sup>1</sup> defines literacy as "an individual's ability to read, write, speak in English, compute and solve problems, at levels of proficiency necessary to function on the job, in the family of the individual, and in society." Literacy is often defined in terms of specific domains such as "basic academic skills," "workplace skills," "life skills," "parenting skills," or skills necessary to exercise one's rights and responsibilities for citizenship. Different dimensions of literacy are often categorized by terms that cluster several dimensions of literacy important for different clients. Examples include workplace literacy (combining both basic academic skills and workplace skills), and family literacy (combining basic academic skills and other skills essential for successful parenting).

2. "Education attainment" usually refers to the numbers of years of schooling completed or the level of credential (e.g., high school diploma or associate degree) an individual has obtained. Despite concerns about the meaning of credentials, there is a strong

correlation between educational attainment and literacy.

3. "Literacy initiatives" often are defined in terms of the needs of a particular target group. These may be parents of young children, youth who have dropped out of high school without earning a high school diploma, welfare recipients, persons with limited English-speaking ability, incarcerated adults, or adults in the workforce.

4. Other literacy initiatives are defined in terms of a particular educational service, strategy, or means to address a target population's literacy problems. "Adult basic education" and "family literacy" are examples. These initiatives are often defined in terms of a particular configuration of services for the target population (e.g., assessment and information and counseling services).

5. The term "lifelong learning" is often associated with "literacy." Lifelong learning is a means to the goal of maintaining necessary levels of literacy throughout one's lifetime. The goal of lifelong learning has implications for both individual adult's learning behavior as well as education policy and the design of the education system.

Goal six of the National Education Goals illustrates a broadly stated goal that incorporates expectations about both adult literacy and the kinds of policies and services that should be in place to improve literacy. Goal six, "Adult Literacy and Lifelong Learning," states that, "By the year 2000, every adult will be literate and possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship." The objectives related to this goal touch on several of the common elements of definitions listed above, for example:

- Different dimensions of literacy (e.g., academic and workplace skills),
- The level of education attainment (e.g., increasing the number of persons who complete postsecondary degrees),
- The needs of target groups (e.g., parents, minorities, or part-time learners),
- The need to increase the availability of particular educational services, strategies or means (e.g., accessibility of libraries to part-time learners or opportunities for parental involvement), and
- The importance of lifelong learning, both in the learning behavior of individuals and in the educational system's responsiveness to the needs of adult learners.

adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge.

Several definitions of adult education has been done Community

- Adult Education is a]in the following examples are given of them. conscious effort by public institutions or voluntary organizations to promote community awareness comes action.
- adult education teaching is typically specific age group above the legal age] limits as formal and informal, voluntary and at different levels of time, place
- Adult Education is a process in which people who]and education is presented. somehow been cut course they consciously to change or advance their skills in information and do organized activities.
- Adult education includes all formal and informal training and volunteer after] school, which by experienced educators and aware of the system.

Educational materials on adult education with daily life, needs, goals, aspirations and past experiences of adults and their relationship helps to results learned in life and career are used.

**Comparison of adult education in various countries:** in developed countries, adult education is a form of

informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings.

In developing countries and backward because the problems in primary education, lack of resources and facilities, poverty, social existence, economic and cultural concept of adult education is different. In such countries the concept of adult education, literacy education is.

Concept of adult education in revolutionary countries, is a combination of these two concepts. Changes in these countries due to social, political and cultural revolution, resulting from, literacy and continuing education necessary to find because of the revolution, there is cultural poverty on the other hand the implementation of development plans and the need for skilled personnel are expert. General adult education system based on economic conditions - social and cultural community is different and each specific goals will follow. General objectives of adult education and literacy in two categories is divided into professional education.

#### **Literacy goals include:**

- Providing primary education in childhood that adults were deprived
- raising awareness for adults;
- knowledge bases and adults about their cultural heritage;
- increase confidence in adults.

#### **Professional education goals include:**

- Equipped with the necessary skills to adults living;
- providing the necessary manpower for the country's goals;
- achieving social equality and equity and eliminate the existing differences between different classes.

#### **Adult characteristics:**

to understand the characteristics of adult learners, their mental and physical condition should be considered in the following referred to some of them.

#### **Operating speed:**

slow reaction in adults is natural that necessarily means reducing the logic and practice skills, not due to weakness and increased awareness of natural forces and their skills.

#### **Consciousness:**

no stimulus and incentives encouraging, despite inhibiting stimuli, slow transfer rate, mental, and weak

inhibitors of natural forces (mostly visual and auditory) are factors that slow reaction affect individual mental and cognitive activities, but never able to understand, understanding and learning ability (which varies with the speed of learning) is not relevant.

**Health:**

what is most age, longer duration is necessary to be heard by listening issue. Why is that when elderly people and old could not hear well, their confidence and vulnerable to the possibility that negative beliefs about their find, they are great. Visual abilities can be like other people, usually decreases with age.

**Background of knowledge - skills and beliefs of adults:**

adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation is.

**Characteristics of adult education:**

**flexibility in time:**

In the past, usually one of the obstacles in the way of learning and development of adult education was being inflexible and time courses were programs. But now most countries have to consider that the speed limit of time and learning ability and facilities must be adults. Flexibility in time means that not only should the time classes and programs for adults is appropriate, but necessary facilities should be provided for independent study.

**Flexibility in the location:**

One of the aspects of flexible space is that individuals can, regardless of their residence to the study and advancing their knowledge and skills pay. For example, adults in remote villages should like people who live in the city use of educational programs. After flexibility in other places is that the issue of specificity of location is not considered primarily educational.

**Flexibility in age:**

Educational opportunities for certain age should not use it for all regardless of their age, is possible. In fact, educational programs must use people of different ages to prepare.

**Flexibility in admission:**

No adult should not only be deprived of education because of the necessary conditions for admission in the

class does. Of course this is not such a person without academic records to participate in university classes is accepted, Adoption order is that the adults in educational programs at different levels, according to the possibility of using the opportunity that is provided must be based on the experience and knowledge and their knowledge is.

**To combine education and job responsibilities:**

Adults should be able to work during that time engaged in training classes take them. In other words, their presence in the class should be considered part of their work. This means that low-literate or illiterate working people who are allowed to work an hour of your daily spending surpassed participation in educational programs.

**Theories of adult education practices**

Individual learning style, including features based on the experience of the person reacts to it and it will analyze (Kraham 1993, p. 17)., based on kolb theory (Kolb 1985), Anyone relying on the skills learning in their individual abilities can grow and promote the field needed to provide learning and learning to be a turning point.. In addition, experiential learning patterns Club, is based on the assumption that learning certain behaviors over students show themselves and therefore can be carried out in four distinct ways simultaneously be exploited. 4 ways mentioned include:

**1-** practices converge - approach requires convergent thinking, analysis and practical application of new means and concepts. Practical meaning and concepts is widespread signs of strength. Surround converge, data and information through a hypothetical argument - deductive organization offers. Desired emphasis on logical thinking and convergent learning style stable, somewhat away from feelings.

**2-** Divergent needs in the way knowledge is intuition. In this way learners prefer talents and abilities to help your imagination and apply their ability to understand complex situations, the horizons have become more varied. So in terms of their capability to complete style information, the total is significant. In this manner the strength of the individual ability of imagination is universal.

**3-** Oriented analysis methods - theoretical models and capabilities create logic inference, the strength of the individual is oriented analysis. Oriented analysis thinking and analysis and then plan and learn to tell. Oriented analysis is no practical things do not insist on learning theories emphasize prefer it even when the facts do not match the theory of the facts, eye wear.

**4-** oriented along way - along with reverse-oriented analysis-oriented, if not in conformity with the theory of reality, putting aside the theory. Oriented along wherever necessary theory in terms of specific benefits. Their strength is when they can do anything to gain



experience and new. Oriented along with intuition, testing methods, and error information of others not through his analytical ability to pay problems.

Proposed model "kelb," suggests that learning activities must be based on the response characteristics and learning style score is based on a comprehensive, yet encouraging learners to use and benefit from learning other ways is considered. Minimum conditions and learning environment can be set way of training.

### Classification of Adult Education

1. reading and writing literacy level
2. Technical and professional education, people are ready for work
3. in the field of health, behavior and health in the family
4. tutorials political, social, religious. Operating political social goals
5. to satisfy emotional needs and entertainment, like art, literature and the like

### Adult education goals:

a) Literacy goals:

1. To provide primary education and to allow other adults to learn skills during childhood and youth have been deprived of them.
2. Increase the ability and skills for adults over the executive government and community programs.
3. Preparation of programs and classes that form the adult intellectual development is dedicated to the goal, get a job or degree is better.
4. Increased confidence in adults, through increased awareness and knowledge.
5. raising awareness of adult interest to participate in decision-making
6. to raise awareness of citizens rights, their duties and responsibilities
7. Adults develop abilities to solve problems of personal and social
8. to inform adults the skills and talents.
9. Spread knowledge about their heritage

b) vocational training objectives:

1. Adults equip the skills necessary for subsistence.
2. To provide staffing to promote industry and economy, the third
3. the elimination of class differences and achieve social equality
4. Training of workers with their employment conditions and industrial variables are consistent.

Vocational training has five pillars:

- a) working
- b) work equipment and supplies (construction, technical and professional equipment, books and ...)
- c) teacher professional
- d) adults who qualify for vocational education are . E) Budget

Adult Education Features (compared to regular education) :

1 - Flexibility in time:

the sense that a religion course in hours and days of the appeal.

2 - Flexibility in place:

people can live without taking their training to take place. (Transfers): a case for training in various locations will provide access to individuals.

3- Flexibility of age:

the curriculum will be developed for different age range.

4 - Flexibility in accepting

5 - along with being able to adult education and job responsibilities:

during that time working in the training classes to attend. In other words, they are part of their training to be considered.

### Conclusion:

To improve the quality of life, learning materials should reinforce the skills they acquired previous. This material should have access to information and provide new technology. should also have to make learning more fun. Additional materials should provide opportunities for literacy skills to read and to strengthen their cognitive awareness.

Track materials (continued) which increased literacy skills and knowledge gained is also effective in enriching learning environment for learners are important. Participatory materials to ensure the participation of learners in the learning process and codification are included out of class activities, dialogue, role playing, etc.

In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them.

Learning activities such as activities outside the

classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered.

Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his.

Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or transfer is provided, develop knowledge, insight and skills they will.

To ensure that science curriculum and educational aspects, according to community needs and audiences, application form is provided or not, the content selection criteria should be considered. These criteria is being include knowledge, effectiveness, flexibility, diversity, relevance and practical learning

Some research findings that can be a learning process for the Guidelines for training operations are applied, is given below:

1 - Preparation for adults to learn how much he depends on previous learning. Knowledge that has accumulated because of an ability to absorb new information more person is. Past educational experience features a diverse group of adult learners, the starting point of any activity on the diversity training is emphasized.

2- intrinsic motivation, learning a deeper and make them sustainable. When the need is met directly by the learning itself, what is learned, but is complementary learning. Creating a training activity in adult learning needs, learning ensures stable

3- Positive reinforcement (reward) learning to reinforce the negative (punishment) is more effective. Many adults because of negative experiences at the beginning of schooling, are weak and afraid. Feeling of success in adult learning for continuous learning and adult participation is essential.

4- Passive than active participation in learning activities, learning increases. Adult educators are allowed to participate actively in India, a stable and meaningful learning to help

5- Environmental factors affect the learning. Tangible things such as noise, crowded places, temperature, light and ... Learning process can be prevented. Other factors such as stress, ridicule, pressure, fatigue and low health can also reduce learning.

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**Reference:**

1. Brookfield, S. D. (1996). *Understanding and Facilitating Adult Learning*. San Francisco: Jossey- Bass.
2. Brookfield, S.D. (1997). *Developing Critical Thinkers: Challenging Adults to Explore Alternative Ways of Thinking and Acting*. San Francisco: Jossey-Bass.
3. Budin, H. (1999). The computer enters the classroom. *Teachers College Record*, 100, 656-669.
4. Cranton, P. (1992). *Working with Adult Learners*. Toronto: Wall & Emerson.
5. Cranton, P. (1996). *Professional Development as Transformative Learning*. San Francisco: Jossey- Bass.
6. Egan, K. (1992). *Imagination in Teaching and Learning*. Chicago: University of Chicago Press.
7. Fabry, D. L., & Higgs, J. R. (1997). Barriers to the effective use of technology in education: Current status. *Journal of Educational Computing Research*, 17(4), 385-395.
8. Fletcher, W. E., & Deeds, J. P. (1994). Computer anxiety and other factors preventing computer use among United States secondary agricultural educators. *Journal of Agricultural Education*, 35(2), 16-21.
9. Ginsburg, L. (1998). Integrating technology into adult learning. In C. Hopye (Ed.), *Technology, basic skills, and adult education: Getting ready and moving forward* (Information Series No. 372, pp. 37- 45). Columbus, OH: Center on Education and Training for Employment. (ERIC Document Reproduction Service No. ED 423 420).
10. Ginsburg, L., & Elmore, J. (2000). *Captured wisdom: Integrating technology into adult literacy instruction*. Naperville, IL: North Central Regional Education Laboratory. (ERIC Document Reproduction Service No. ED 454 408).
11. Glenn, A. D. (1997). Technology and the continuing education of classroom teachers. *Peabody Journal of Education*, 72(1), 122-128.
12. Habermas, Jurgen. (1991). *Knowledge and Human Interests*. Boston: Beacon Press.
13. Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
14. Hartree, A. (1994). Malcolm Knowles' theory of andragogy: A critique. *International Journal of Lifelong Education*, 3(3). 203-210.

15. Hopey, C. (1999). Technology and adult education: Rising expectations. *Adult Learning*, 10(4), 26-29.
16. Isahak Haron & Doraisamy, J. (1992). Lifelong education in Malaysia: A general survey. Thesis Mas. UM. 10. 1-13. Kuala Lumpur: Universiti Malaya.
17. Kim K. (2000). Participation in adult education in the United States, 1998-1999. U.S. Dept. Of Education, Office of Educational Research and Improvement.
18. Knowles, M. S. (1992). *The modern practice of adult education, andragogy versus pedagogy*. Author of the *Classic Informal Adult Educator*, 3rd Edn. New York: Association Press.
19. Knowles, M. S. (1994). *Andragogy in action: Applying modern principles of adult learning*. San Francisco: Jossey-Bass Inc. Pub.
20. Knowles, M. S. (1999). *The making of adult educator: An autobiographical journey*. 1st Edn. San Francisco: Jossey-Bass Inc. Pub.
21. Kolb, David A. (1993). *Experiential learning: Experience as the source of learning and development*. 1st Edn. United States: FT Press.
22. Kotrlik, J.W., & Smith, M. N. (1999). Computer anxiety levels of vocational agriculture and other vocational teachers. In M. F. Burnett (Ed.), *Proceedings, national agricultural education research meeting* (pp. 1-9). Columbus, OH: American Association for Agricultural Education.
23. Krajnc, A. (1999). *Andragogy*. In Collin, J. T. (Ed.), *Lifelong education for adults: An international handbook*. 1st Edn. New York: Pergamon Press.
24. Lang, J. M. (1998). *Technology in adult basic and literacy education: A rationale and framework for planning* (Research report). Cheney: Eastern Washington University, Instructional Media and Technology. Retrieved on November 14, 2003, from <http://cehd.ewu.edu/education/GraduateExamples/JML98Educ601.html>
25. Mazanah Muhamad & Associates. (2001). *Adult and continuing education in Malaysia*. 1st Edn. Kuala Lumpur: Universiti Putra Malaysia.
26. Merriam, S.B., Baumgarther, L.M., & Caffarella, R.S. (1999). *Learning in adulthood: A comprehensive guide*. 2nd Edn. San Francisco: Jossey-Bass Pub.
27. Mezirow, Jack and Associates (Eds.) (1990). *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Education*. San Francisco: Jossey-Bass.
28. Moore, M. G., & Kearsley, G. (1996). *Distance education: Asystems* view. Belmont, CA: Wadsworth.
29. Office of Technology Assessment, U.S. Congress. (1993). *Adult literacy and new technologies: Tools for a lifetime* (Final Report No. OTA-SET-550). Washington, DC: Government Printing Office.
30. Neculau, A. (2004). *The adults' education: Romanian experiences*. Iasi, Polirom Publishing House. P un, E. (1999). *The school: A socio-pedagogical approach*. Iasi, Polirom Publishing House.
31. Norzaini Azman. (2006). History, trends and significant development of adults education in Malaysia in *HISTORIA: Journal of Historical Studies*. Vol. VII, No. 2. Bandung: Historia Utama Press.
32. Pratt, D.D. (1993). *Andragogy after twenty-five years: New directions for adult and continuing education*. Journal Articles. San Francisco: Jossey-Bass Inc. Pub.
33. Olgren, C. H. (2000). Learning strategies for learning technologies. In E. J. Burge (Ed.), *The strategic use of learning technologies. New directions in adult and continuing education* (Vol. 88, pp. 7-16). San Francisco: Jossey-Bass.
34. Schifirnet C. (1997). *Changing Adults' Education*. Bucharest, Fiat Lux Printing House.
35. Sutton-Smith, Brian. (1988). In Search of the Imagination. In K. Egan and D. Nadaner (Eds.), *Imagination and Education*. New York, Teachers College Press.
36. UNESCO. (1999). *The Hamburg Declaration. Fifth international conference on adult education (Confitea V)*. Paris: UNESCO.

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## Taxonomic Study, Phylogenetic Characterization and Factors Affecting on the Biosynthesis Antimicrobial Agents Produced By *Streptomyces lydicus*

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**Abstract:** This work was carried out in the course of a screening program for specifying the bioactive substances that demonstrated inhibitory effects against microbial pathogenic, from actinomycetes strains. Eighty eight actinomycete strains were isolated from twelve soil samples collected from different localities in Egypt. Only one actinomycete culture AZ-55 from eight cultures was found exhibited to produce wide spectrum antimicrobial activities. The nucleotide sequence of the 16s rRNA gene (1.5 Kb) of the most potent strain evidenced an 99% similarity with *Streptomyces lydicus*. From the taxonomic features, the actinomycetes isolate AZ-55 matches with *Streptomyces lydicus* in the morphological, physiological and biochemical characters. Thus, it was given the suggested name *Streptomyces lydicus*, AZ-55. The parameters controlling the biosynthetic process of antimicrobial agent formation including: different inoculum size, pH values, temperatures, incubation period and different carbon and nitrogen sources were fully investigated.

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**Key words:** *Streptomyces lydicus*, Taxonomic study, Phylogenetic Characterization, factors affecting antimicrobial activity.

### 1. Introduction

Actinomycetes is one of the most attractive families of industrial bacteria on account of their superior potential for producing valuable secondary metabolites including antibiotics, anti-cancer drugs, immunosuppressors and enzyme inhibitors (Zitouni *et al.*, 2004a and Sanasam and Ningthoujam, 2005). The species belonging to the genus *Streptomyces* constitute 50% of the total population of soil actinomycetes and 75-80% of the commercially and medicinally useful antibiotics have been derived from this genus (Lazzarini *et al.*, 2000). The list of novel microorganisms and products derived from poorly explored areas of the world like China, Australia, Antarctica and Jordan suggests that a careful exploration of new habitats might continue to be useful (Zitouni *et al.*, 2004a). The search for new antibiotics continues to be almost importance in research programs around the world because the increase of the resistant pathogens and toxicity of some used antibiotics. Among microorganisms actinomycetes are one of the most investigated groups particularly members of the genus *Streptomyces* from which, a large number of antibiotics was obtained and studied (Gupte *et al.*, 2000). The vast majority of actinomycetes have originated from soil (Shearer, 1997) and their isolation method deal almost exclusively with those suitable for *Streptomyces* species which grow rapidly on soil

dilution plates. However, in recent years, the rate of discovery of new antibiotics in the genus *Streptomyces* was declining and isolation of other actinomycete genera, appeared to be necessary to assess the health hazard and to and novel strains producing commercially valuable antibiotics. With the discovery of new antibiotics from strains of *Actinomadura*, *Micromonospora*, *Saccharothrix* and *Streptosporangium*, increased emphasis was placed on developing methods for the isolation and identification of non-streptomycete actinomycetes (Shearer, 1997). During a screening program for *Streptosporangium*, strains can produce valuable substances of biotechnological interest search of potent antimicrobial products, was focused on antibiotic producing rare actinomycetes. Selective methods were used to isolate new strains producing new antibiotics (Zitouni *et al.*, 2004b). It has been also found that *Streptosporangium* strains can produce valuable substances of biotechnological interest (Ammor *et al.*, 2008).

The present study described the isolation of an actinomycete strain from Zagazig districted, The identification of this strain, based on the cultural, morphology, physiology and biochemical characteristics, as well as 16s rRNA methodology. The primary bioactive substances were tested against Gram positive and Gram negative bacteria and unicellular and

filamentous fungi. Whereas, studies the parameters controlling on the biosynthetic process of antimicrobial agent formation.

## 2. Material and Methods

**2.1. Actinomycete strain:** Strain AZ-55 was isolated from a suspension of a soil sample (Williams and Davis, 1965) inoculated onto a Starch-nitrate agar it was composed of (g/l) starch, 10; NaNO<sub>3</sub>, 2; K<sub>2</sub>HPO<sub>4</sub> 1; MgSO<sub>4</sub>·7H<sub>2</sub>O, 0.5; KCl, 0.5; microelement, 1 ml; and agar 20. The pH was adjusted to 7.2 before sterilization using 1 N NaOH or 1 N HCl. Stock solution was composed of (g/500 ml) FeSO<sub>4</sub>·7H<sub>2</sub>O, 0.5; MnCl<sub>2</sub>·4H<sub>2</sub>O, 0.5; and ZnSO<sub>4</sub>·7H<sub>2</sub>O, 0.5. Plates and incubated at 30°C for five days. The soil samples were collected from the Zagazig district. The isolates were individually maintained on Starch-nitrate agar at 4°C and stored as a mixture of hyphae and spores in 20% glycerol at -80°C. Each isolated strain was cultured in a Starch-nitrate broth: This medium contained the same ingredients as mentioned above for starch-nitrate agar with the omission of agar. After clarification of the culture broths, the supernatant tested for antimicrobial activity.

## 2.2. Test organisms:

### 2.2.1. Bacteria:

**2.2.1.1. Gram-positive Bacteria:** *Staphylococcus aureus*, NCTC 7447; *Bacillus subtilis*, NCTC 1040; *Bacillus pumilus*, NCTC 8214 and *Micrococcus luteus*, ATCC 9341.

**2.2.1.2. Gram-negative Bacteria:** *Escherichia coli*, NCTC 10416; *Klebsiella pneumoniae*, NCIMB 9111 and *Pseudomonas aeruginosa*, ATCC 10145

### 2.2.2. Fungi:

**2.2.2.1. Unicellular Fungi:** *Candida albicans*, IMRU 3669 and *Saccharomyces cerevisiae* ATCC 9763

**2.2.2.1. Filamentous Fungi:** *Asp. niger*, IMI 31276; *Aspergillus flavus*, IMI 111023, *Aspergillus fumigatus*, ATCC 16424; *Fusarium oxysporum* and *Penicillium chrysogenum*.

**2.3. Screening for antimicrobial activity:** The antimicrobial activity was determined by cup method assay according to (Kavanagh, 1972).

## 2.4. Taxonomic studies of actinomycete isolate:

**2.4.1. Morphological characteristics** of the most potent produce strain AZ-55 grown on starch nitrate agar medium at 30 °C for 4 days was examined under scanning electron microscopy (JEOL Technics Ltd.,).

### 2.4.2. Physiological and biochemical characteristics:

The ability of the strain to produce different enzymes was examined by using standard methods. Lecithinase was conducted on egg-yolk medium according to the

method of (Nitsh and Kutzner, 1969); Lipase (Elwan *et al.*, 1977); Protease (Chapman, 1952); Pectinase according to the method of (Hankin *et al.*, 1971);  $\alpha$ -amylase according to the method of (Cowan, 1974) and Catalase test according to the method of (Jones, 1949). Melanin pigment according to the method of (Pridham *et al.*, 1957). Degradation of Esculin and xanthine according to the method of (Gordon *et al.*, 1974). Nitrate reduction according to the method of (Gordon, 1966). Hydrogen sulphide production and oxidase test according to the method of (Cowan, 1974). The utilization of different carbon and nitrogen sources according to the methods of (Pridham and Gottlieb, 1948). Cell wall was performed by the method of (Becker *et al.*, 1964 and Lechevalier and Lechevalier, 1970). Cultural characteristics such as color of aerial mycelium, color of substrate mycelium and pigmentation of the selected actinomycete were recorded on ISP agar medium (Shirling and Gottlieb, 1966). Colors characteristics were assessed on the scale developed by (Kenneth and Deane, 1955).

### 2.4.3. DNA isolation and manipulation:

The locally isolated actinomycete strain was grown for 5 days on a starch agar slant at 30°C. Two ml of a spore suspension were inoculated into the starch- nitrate broth and incubated for 3 days on a shaker incubator at 200 rpm and 30°C to form a pellet of vegetative cells (pre-sporulation). The preparation of total genomic DNA was conducted in accordance with the methods described by (Sambrook *et al.*, 1989).

### 2.4.4. Amplification and sequencing of the 16S rRNA gene:

PCR amplification of the 16S rRNA gene of the local actinomycete strain was conducted using two primers, StrepF; 5'-ACGTGTGCAGCCCAAGACA-3. and Strep R; 5'-ACAAGCCCTGGAAACGGGGT-3., in accordance with the method described by (Edwards *et al.*, 1989). The PCR mixture consisted of 30 pmol of each primer, 100 ng of chromosomal DNA, 200  $\mu$ M dNTPs, and 2.5 units of Taq polymerase, in 50  $\mu$ l of polymerase buffer. Amplification was conducted for 30 cycles of 1 min at 94°C, 1 min of annealing at 53°C, and 2 min of extension at 72°C. The PCR reaction mixture was then analyzed via agarose gel electrophoresis, and the remaining mixture was purified using QIA quick PCR purification reagents (Qiagen, USA). The 16S rRNA gene was sequenced on both strands via the dideoxy chain termination method, as described by (Sanger *et al.*, 1977). The 16S rRNA gene (1.5 kb) sequence of the PCR product was acquired using a Terminator Cycle Sequencing kit (ABI Prism 310 Genetic Analyzer, Applied Biosystems, USA).

### 2.4.5. Sequence similarities and phylogenetic analysis

The BLAST program ([www.ncbi.nlm.nih.gov/blst](http://www.ncbi.nlm.nih.gov/blst)) was

employed in order to assess the degree of DNA similarity. Multiple sequence alignment and molecular phylogeny were evaluating using BioEdit software (Hall, 1999). The phylogenetic tree was displayed using the TREE VIEW program.

**2.5. Factors effecting on the biosynthesis of the antimicrobial agent:** These included inoculum size, incubation period, pH values, incubation temperatures; different carbon and nitrogen sources, have been determine by the standard methods.

### 3. RESULTS

**3.1. Screening for the antimicrobial activities:** One of the actinomycete cultures AZ-55 from eight cultures were found exhibited various degrees of activities against Gram-positive and Gram-negative bacteria and unicellular and filamentous fungi (Table 1).

#### 3.2. Identification of the actinomycete isolate:

**3.2.1. Morphological characteristics:** The vegetative mycelia grew abundantly on both synthetic and complex media. The aerial mycelia grew abundantly on Starch-nitrate agar medium; Oatmeal agar medium (ISP-3) and Inorganic salts starch agar medium (ISP-4). The Spore chains were spiral, and had a smooth surface (Plate 1). Neither both sclerotic granules and sporangia nor flagellated spores were observed.

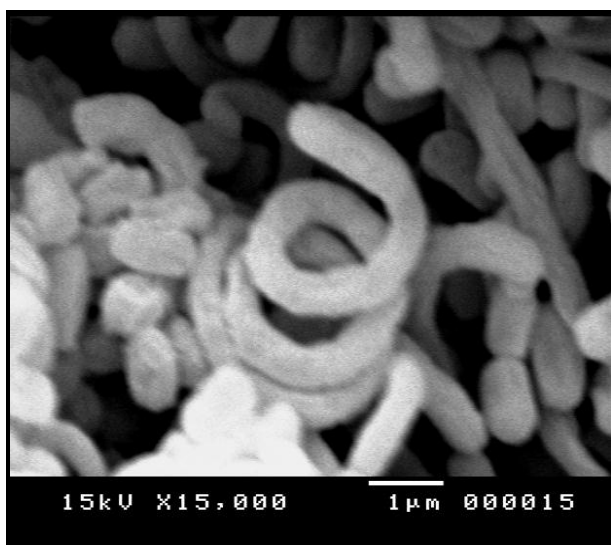


Plate (1). Scanning electron micrograph of the actinomycete isolate AZ-55 growing on starch nitrate agar medium showing spore chain Spiral shape and spore surfaces smooth (X15,000).

**3.2.2. Cell wall hydrolysate:** The cell wall hydrolysate contains LL-diaminopimelic acid (LL-DAP) and sugar pattern not detected.

**3.2.3. Color and culture characteristics:** As shown in Table (2), the AZ-55 grew on the ISP-media. The isolate exhibited good growth on starch-nitrate agar medium, the aerial mycelium showed dark gray color, substrate mycelium is moderate yellowish brown and the diffusible pigment is dark grayish yellowish brown. No growth on tryptone- yeast extracts broth (ISP-1) and yeast extract –malt extract agar medium (ISP-2). Good growth was detected on Oat- meal agar medium (ISP-3). Aerial mycelium is light gray, and substrate mycelium is moderate yellowish brown and no diffusible pigments are seen. Moderate growth was detected on inorganic salts- starch agar medium (ISP-4). Aerial mycelium is light gray and substrate mycelium is light brown and no diffusible pigments are visible. Moderate growth was detected on glycerol–asparagine agar medium (ISP-5). Aerial mycelium is light gray; substrate mycelium is brown and no diffusible pigment. Poor growth was detected on peptone yeast extract-iron agar medium (ISP-6), aerial mycelium is light gray; substrate mycelium is light yellowish brown, and diffusible pigment moderate brown. Poor growth was detected on tyrosine agar medium (ISP-7), aerial mycelium is light gray, substrate mycelium is light yellowish brown, and diffusible pigment is moderate yellowish brown.

#### 3.2.4. Physiological and biochemical characteristics:

The actinomycete isolate AZ-55 could hydrolyze protein, starch, lecithin and casein hydrolysis are positive whereas lipid, pectin and Catalase test are negative. Melanin pigment, production of H<sub>2</sub>S, KCN test, and nitrate reduction are negative. Degradation of esculin, xanthine, utilization of citrate, and decomposition of urea are positive. The isolate utilizes, mannose, glucose, galactose, sucrose, mannitol, raffinose, *meso*-insoitol, arabinose, lactose, maltose, fructose, sodium malonate, L-phenylalanine, L-arginine, L-glutamic acid, xylose and L-cysteine whereas it failed to utilize L-valine, histidine and rhamanose. Good growth could be detected within a temperature range of 20 to 45 °C. Growth in the presence of NaCl up to 7% was recorded and growth at different pH values from 5 to 8 was also recorded and finally no growth in the presence of growth inhibitors; sodium azide (0.01 w/v), phenol (0.1 w/v) and thallos acetate (0.001 w/v) (Table 3).

**3.2.5. Taxonomy of actinomycete isolate, AZ-55:** This was performed basically according to the recommended international Key's viz. (Buchanan and Gibsons, 1974; Williams, 1989; and Hensyl, 1994). On the basis of the previously collected data and in view of the comparative study of the recorded properties of AZ-55 in relation to the most closest reference strain, viz. *Streptomyces lydicus*, it could be stated that actinomycetes isolate, AZ-55 is suggestive of being

likely belonging to *Streptomyces lydicus*, AZ-55 (Table 4).

**3.2.6. Amplification of the 16S rDNA gene:** The 16S rDNA gene was amplified by polymerase chain reaction (PCR) using the universal primers. The primers that was used to 16S rDNA sequencing were 16F357 of the sequence strepF; 5'-ACGTGTGCAGCCCAAGACA-3' and strpR; 5'-ACAAGCCCTGGAAACGGGGT-3', the product of the PCR was analyzed on 1.5% ethidium bromide gel.

**3.2.7. Molecular phylogeny of the selected isolate:** The 16S rDNA sequence of the local isolate was compared to the sequences of *Streptomyces* spp. In order to determine the relatedness of the local isolate to these *Streptomyces* strains. The phylogenetic tree (as displayed by the Tree View program) revealed that the locally isolated strain is closely related to *Streptomyces* sp., rather related to *Streptomyces* sp., rather than to *Streptomyces lydicus* (Fig. 1). Multiple sequence alignment was conducted the sequences of the 16<sub>s</sub> rDNA gene of *Streptomyces lydicus*. Computer assisted DNA searches against bacterial database similarly revealed that the 16<sub>s</sub> rDNA sequence was 99% identical *Streptomyces lydicus* (Fig. 1).

### 3.3. Factors effecting on the biosynthesis of the antimicrobial agent produced by *Streptomyces lydicus*, AZ-55

**3.3.1. Effect of different inoculum size:** Data illustrated graphically in (Fig. 2) showed the relation between antibiotic productivity, inoculum size. The maximum inhibition zones of produced antimicrobial agents against tested microorganisms reached up to 28.0, 26.0, 21.0 & 19.0 in case of *Staph. aureus*, NCTC 7447, *Klepseilla pneumonia* NCIMB 9111, *Candida albicans* IMRU 3669 and *Aspergillus niger*, IMI 31276 respectively at an inoculum size of 4 (discs per 100 media) in all cases.

**3.3.2. Effect of different incubation periods:** Data illustrated graphically in (Fig. 3) showed the relation between antibiotic productivity and time of incubation. The level of antimicrobial agents yield increased gradually with increasing the incubation period up to the end of 5 days, after this maximum values 28.5, 27.4, 21.8 & 20.0 in case of *Staph.*

*aureus*, NCTC 7447, *Klepseilla pneumonia* NCIMB 9111, *Candida albicans* IMRU 3669 and *Aspergillus niger*, IMI 31276 respectively.

**3.3.3. Effect of different incubation temperature (°C):** Data represented graphically in (Fig. 4) showed that, the optimum temperature capable of promoting antimicrobial agents biosynthesis by *Streptomyces lydicus*, AZ-55 was at 30 °C, whereas, the diameter of inhibition zone resulted from antimicrobial agents productivity reached up to 28.8, 27.5, 21.8 & 20.0 in case of *Staph. aureus*, NCTC 7447, *Klepseilla pneumonia* NCIMB 9111, *Candida albicans* IMRU 3669 and *Aspergillus niger*, IMI 31276 respectively.

**3.3.4. Effect of different pH values:** The results represented graphically in (Fig. 5) that, the optimum initial pH value capable of promoting antimicrobial agents biosynthesis by *Streptomyces lydicus*, AZ-55 was found to be at the value of 7.0 since the diameter of inhibition zone resulted from antimicrobial agents productivity reached up to 28.8, 27.5, 21.8 & 20.0 in case of *Staph. aureus*, NCTC 7447, *Klepseilla pneumonia* NCIMB 9111, *Candida albicans* IMRU 3669 and *Aspergillus niger*, IMI 31276 respectively.

**3.3.5. Effect of different carbon sources:** Data given in (Fig. 6) indicated that the addition of different equimolecular carbon sources for production of antimicrobial agents revealed that sucrose is the best carbon source for biosynthesis antimicrobial substances. The effect of the used carbon sources in production of antimicrobial agent could be arranged in the following descending manner; for *Streptomyces lydicus*, AZ-55, sucrose> starch> mannitol> meso-insitol> Glucose> mannose> fructose.

**3.3.6. Effect of different nitrogen sources:** The nitrogen sources exhibited an increase in the level of antimicrobial agent production by *Streptomyces lydicus*, AZ-55. The effect of the used nitrogen sources in production of antimicrobial agent could be arranged in the following descending manner; for *Streptomyces lydicus* AZ-55, NaNO<sub>3</sub>>KNO<sub>3</sub>> NH<sub>4</sub>Cl> (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>> peptone> urea (Fig. 7).

Table 1. Antimicrobial potentialities of the antibiotic-producing microorganisms isolated from various localities.

*Organism number	* Mean values of inhibition zones (in mm) against													
	Bacteria							Fungi						
	<i>Staph. aureus</i> , NCTC 7447	<i>Bacillus subtilis</i> , NCTC 1040	<i>Bacillus pumilus</i> , NCTC 8214	<i>M. luteus</i> , ATCC 9341	<i>E. coli</i> , NCTC 10416	<i>K. pneumoniae</i> , NCIMB 9111	<i>P. aeruginosa</i> , ATCC 10145	<i>Candida albicans</i> , IMRU 3669	<i>S. cerevisiae</i> , ATCC 9763	<i>Asp. niger</i> , IMI 31276	<i>Asp. fumigatus</i>	<i>Asp. flavus</i> , IMI 111023	<i>F. oxysporum</i>	<i>P. chrysogenum</i>
AZ-55	28.0	28.0	28.0	29.5	27.0	26.0	22.0	21.0	21.0	19.0	0.0	17.0	20.0	0.0
AZ-65	25.0	25.0	274.5	25.0	22.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AZ-102	24.0	23.0	23.0	24.0	22.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AZ-111	21.0	20.0	20.0	22.0	20.0	16.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AZ-124	18.0	17.0	16.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AZ-128	21.0	20.0	20.0	21.0	17.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AZ-132	27.0	26.0	27.0	26.0	25.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AZ-139	18.0	18.0	17.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 2. Culture characteristics of the actinomycete isolate AZ-55.

Medium	Growth	Aerial mycelium	Substrate mycelium	Diffusile pigments
1-Starch nitrate agar medium	Good	266-d. gray dark gray	77-m.ybr moderate yellowish brown	81-d.gy-ybr dark grayish yellowish brown
2-Tryptone yeast extract broth (ISP-1)	No growth	-	-	-
3-Yeast extract malt extract agar medium (ISP-2)	No growth	-	-	-
4-Oatmeal agar medium (ISP-3)	Good	264-1. gray light gray	77-m.ybr moderate yellowish brown	-
5-Inorganic salts starch agar medium (ISP-4)	moderate	264-1. gray light gray	57-1.br light brown	-
6-Glycerol – asparagine agar medium (ISP-5)	Good	264-1. gray light gray	57-1.br light brown	-
7-Peptone yeast extract iron agar medium (ISP-6)	Poor	264-1. gray light gray	77-m.ybr moderate yellowish brown	o^ m-br moderate brown
8-Tyrosine agar medium (ISP-7)	Poor	264-1. gray light gray	76-1-y-br Light yellowish Brown	77-m.ybr moderate yellowish brown

\*The color of the organism under investigation was consulted with the ISCC-NBS color –name charts illustrated with centroid color



Table 3. The morphological, physiological and biochemical characteristics of the actinomycete isolate AZ-55.

Characteristic	Result	Characteristic	Result
<b>Morphological characteristics:</b>		Mannitol	++
Spore chains	Spiral	L- Arabinose	+
Spore mass	gray	<i>meso</i> -Inositol	++
Spore surface	smooth	Lactose	+
Color of substrate mycelium	Yellowish brown	Maltose	+
Diffusible pigment	Moderate yellowish Brown	D-fructose	+
Motility	Non-motile	Sodium malonate	+
<b>Cell wall hydrolysate</b>		<b>Utilization of amino acids:</b>	
Diaminopimelic acid (DAP)	LL-DAP	L-Cysteine	+
Sugar Pattern	Not-detected	L-Valine	-
<b>Physiological and biochemical properties:</b>		L-Histidine	-
<b>Hydrolysis of:-</b>		L-Phenylalanine	+
Starch	+	L-Arginine	+
Protein	+	L-Glutamic acid	+
Lipid	-	<b>Growth inhibitors</b>	
Pectin	-	Sodium azide (0.01)	-
Casein & Lecithin	+	Phenol (0.1)	-
Catalase test	-	Thallos acetate (0.001)	-
<b>Production of melanin pigment on:</b>		<b>Growth at different temperatures (°C):</b>	
Peptone yeast- extract iron agar	-	10	-
Tyrosine agar medium	-	15	±
Tryptone – yeast extract broth	-	20-45	+
<b>Degradation of:</b>		50	-
Xanthin	+	<b>Growth at different pH values:</b>	
Esculin	+	3 - 4.5	-
H <sub>2</sub> S Production	-	5-8	+
Nitrate reduction	-	8.5-12	-
Citrate utilization	+	<b>Growth at different concentration of NaCl (%)</b>	
Urea test	+	1-7	+
KCN test	-	10	-
<b>Utilization of carbon sources</b>			
D-Xylose	-		
D- Mannose	+		
D- Glucose	+		
D- Galactose	+		
Sucrose	+++		
L-Rhamnose	-		
Raffinose	+		
Starch	+++		

+ =Positive , - = Negative , ± = doubtful results , ++ = moderate growth & +++ = good growth.

Table 4. A comparative study of the characteristics of actinomycete isolate, AZ-55 in relation to reference strain ' *Streptomyces lydicus* (C.F. Hensyl,1994, Page693 and Table 27.5).

Characteristics	AZ-55	Hensyl (1994) <i>Streptomyces lydicus</i>
<b>Morphological characteristics:</b>		
Spore mass	Gray	Gray
Spore surface	Spiral	Spiral
Color of substrate mycelium	yellowish-brown	yellowish-brown
Spore surface	Smooth	Smooth
Motility	Non-Motile	Not-Motile
<b>Cell wall hydrolysate</b>		
- Diaminopimelic acid (DAP)	LL-DAP	LL-DAP
- Sugar pattern	Not-detected.	Not- Detected
Melanin pigment	-	-
<b>Hydrolysis of:</b>		
Casein	+	+
protein	+	+
Pectin	-	-
Starch	+	+
Egg-Youk	+	+
<b>Degradation of:</b>		
Esculine	+	+
Xanthine	+	+
H <sub>2</sub> S production	-	-
Nitrate reduction	-	-
<b>Utilization of:</b>		
Sucrose	+	+
Mannitol	+	+
<i>meso</i> -Inositol	+	+
Rhamnose	-	-
L-Cysteine	+	+
L-valine	-	-
L-Phenylalanine	+	+
L-Histidine	-	-
Optimum growth temperature	30 <sup>o</sup> C	30 <sup>o</sup> C
Optimum pH	7	7
Growth at NaCl (7.0 % )	+	+
<b>Growth inhibitors</b>		
Sodium azide (0.01)	-	-
Phenol (0.1)	-	-
Thallos acetate (0.001)	-	-

+=Positive, -=Negative.

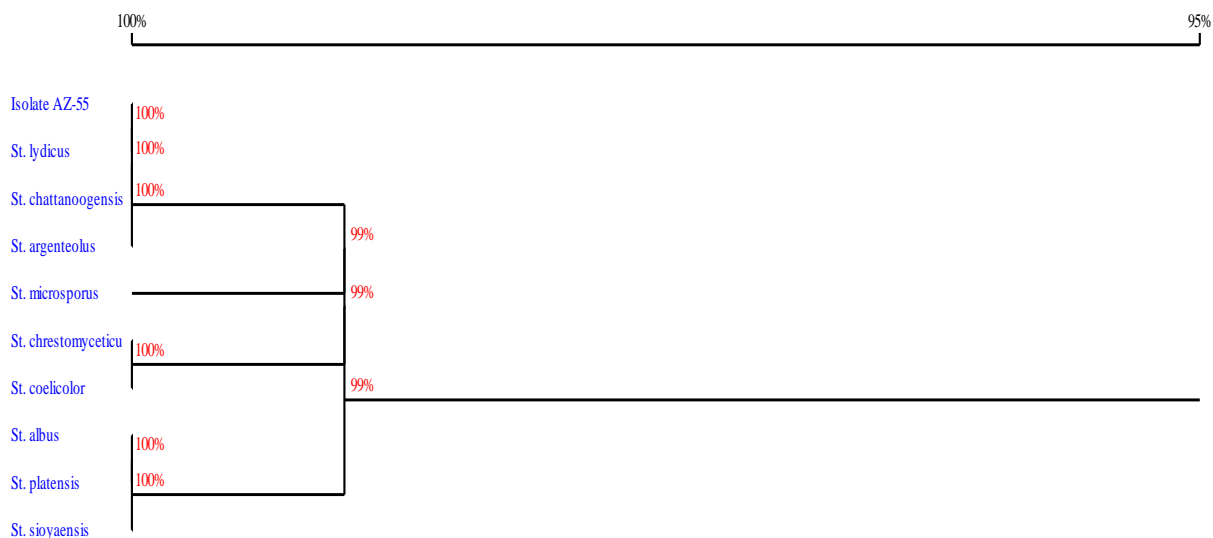


Figure 1. The phylogenetic position of the local *Streptomyces* sp. strain among neighboring species. The phylogenetic tree was based on the multiple sequence alignment comparisons of 16S rDNA sequences.

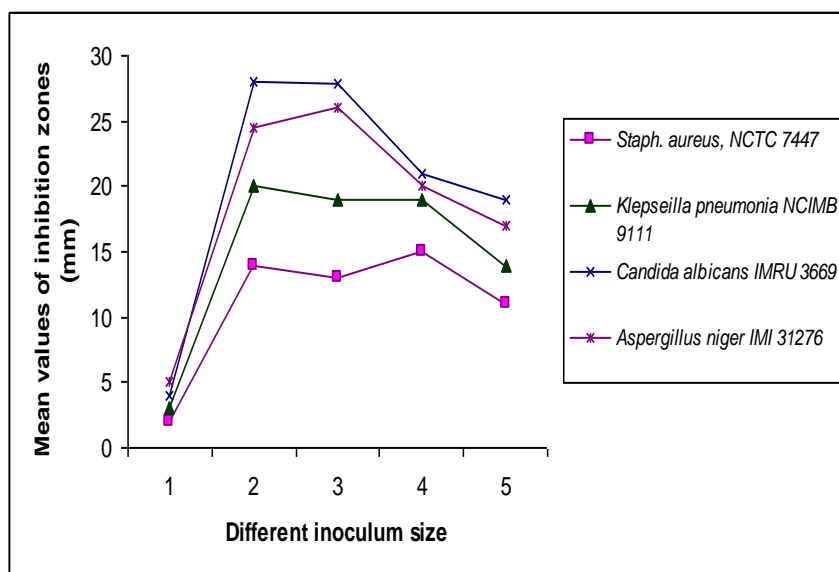


Figure 2. Effect of different inoculum size on the antibiotic yield produced by *Streptomyces lydicus*, AZ-55.

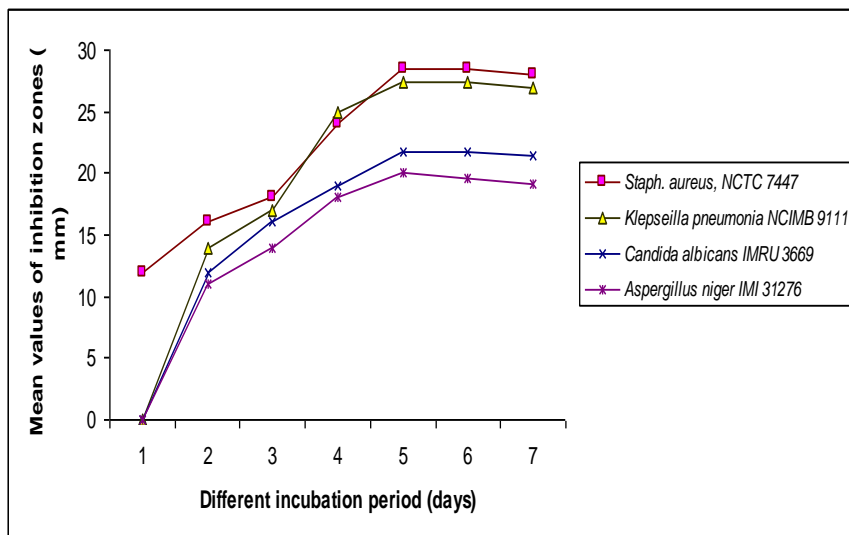


Figure 3. Effect of different incubation periods on the antimicrobial agent(s) biosynthesis produced by *Streptomyces lydicus*, AZ-55.

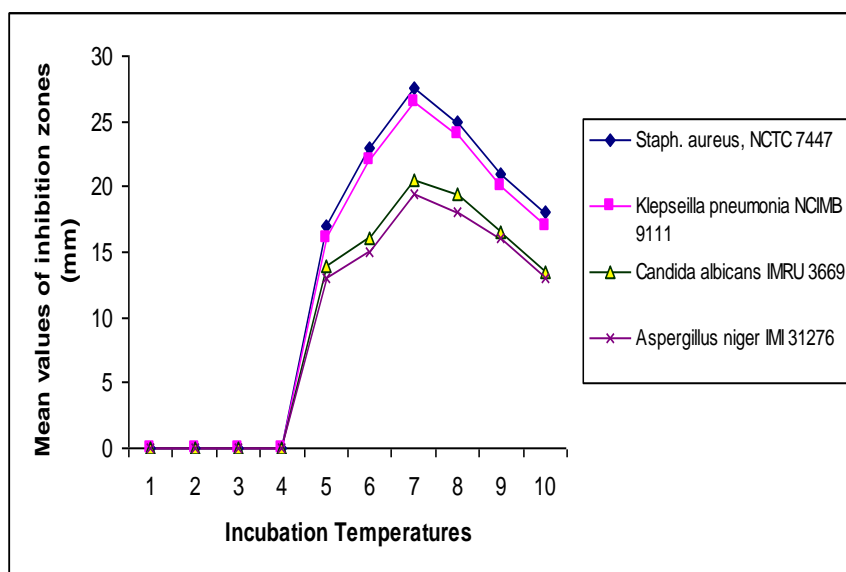


Figure 4. Effect of different incubation temperature on the antimicrobial agent(s) biosynthesis produced by *Streptomyces lydicus*, AZ-55 [1=5; 2=10; 3=15; 4=20; 5=25; 6=30; 7=35; 8=40; 9=45 and 10=50]

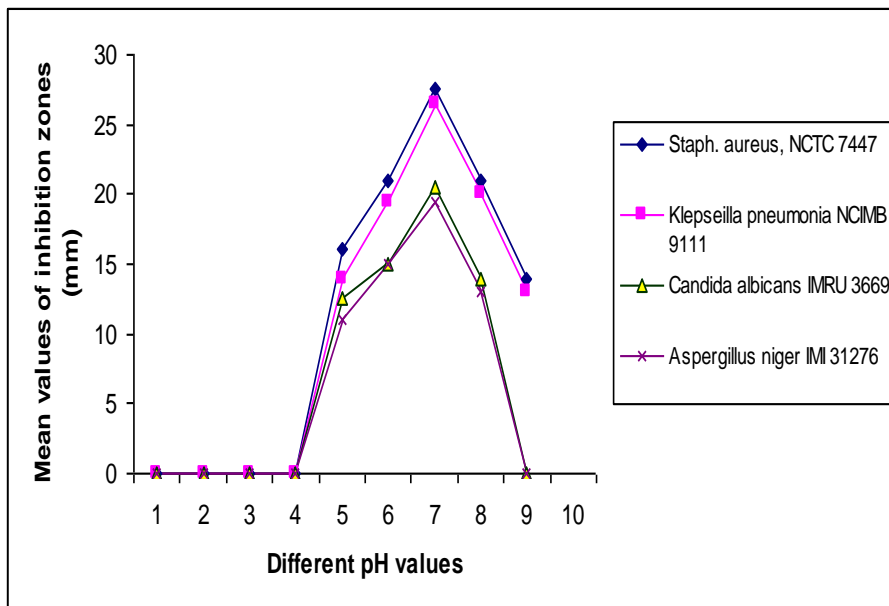


Figure 5. Effect of different pH values on the antimicrobial agent(s) biosynthesis produced by *Streptomyces lydicus*, AZ-55.

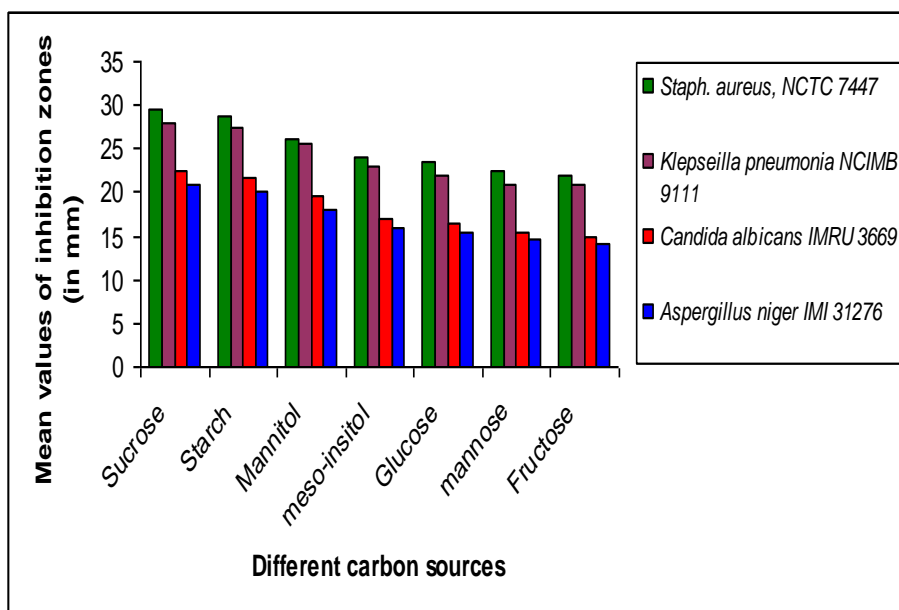


Figure 6. Effect of different carbon sources on the antimicrobial agent(s) biosynthesis produced by *Streptomyces lydicus*, AZ-55.

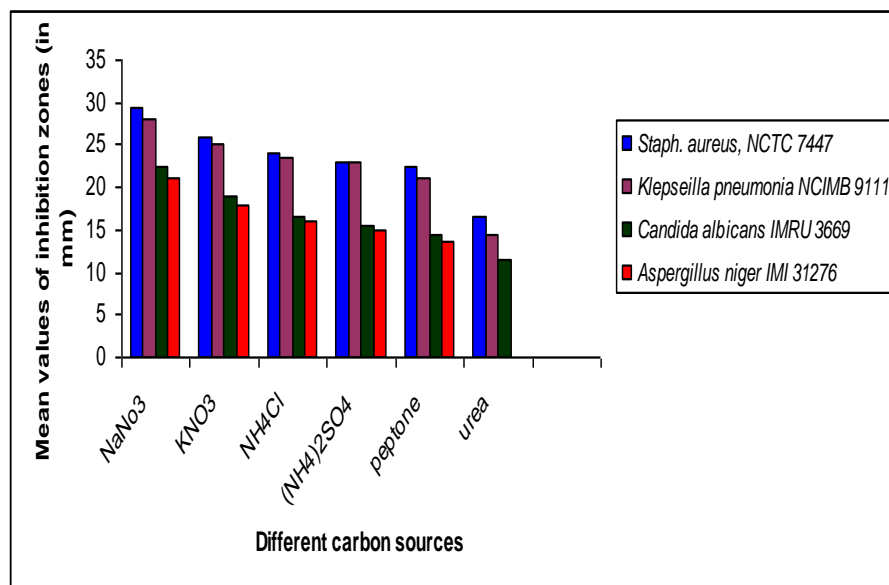


Figure 7. Effect of different nitrogen sources on the antimicrobial agent(s) biosynthesis produced by *Streptomyces lydicus*, AZ-55.

#### 4. DISCUSSION

The increase in the frequency of multi-resistant pathogenic bacteria is created an urgent demand in the pharmaceutical industry for more rational approaches and strategies to the screening of new antibiotics with a broad spectrum of activity, which resist the inactivation processes exploited by microbial enzymes (Motta *et al.*, 2004). Eighty-eight actinomycete strains were isolated from twelve soil samples collected from Zagazig districted, Egypt. Only one actinomycete culture AZ-55 from eight cultures was found exhibited to produce wide spectrum antimicrobial activities. Identification process has been carried out according to (Williams, 1989 and Hensyl, 1994). For the purpose of identification of actinomycete isolate, the morphological characteristics and microscopic examination emphasized that the spore chain is spiral. Spore mass is light gray; while spore surface is smooth, substrate mycelium is yellowish brown and no diffusible pigment was produced on ISP-media. The results of physiological, biochemical characteristics and cell wall hydrolysate of actinomycetes isolate, exhibited that the cell wall containing LL-diaminopimelic acid (DAP) and sugar pattern of cell wall hydrolysate could not detected. These results emphasized that the actinomycetes isolate related to a group of *Streptomyces*. In view of all the previously recorded data, the identification of actinomycete isolate AZ-55 was suggestive of being belonging to *Streptomyces lydicus*, AZ-55. The resulted sequence was aligned with available almost complete sequence of type strains of

family streptomycetaeae. It formed phylogenetic line that was closely related to *Streptomyces lydicus*, AZ-55, sharing 16s rRNA gene similarity matrix is 99%.

Maximum antimicrobial activity biosynthesis could be recorded that a different inoculum sizes for four discs; incubation period for five days (Adinarayana *et al.*, 2002); pH 7.0 (Atta, 2009 and 2010); temperature 30°C (Khalifa, 2008); sucrose best carbon source (Hoshino *et al.*, 2004); NaNO<sub>3</sub> best nitrogen source (Atta *et al.*, 2011).

#### 5. Conclusion

Actinomycetes are producers of potent metabolic compounds used commercially as antibiotics and other novel drugs. The present study shows the present data focusing on obtaining microbial local isolates which have the ability to produce antimicrobial agent. An interesting scope for further research would be to improve antimicrobial agent production by *Streptomyces lydicus*, AZ-55 against pathogenic microorganisms (Gram positive and Gram negative bacteria and unicellular and filamentous fungi) and studies the parameters controlling the biosynthetic process of antimicrobial agent formation.

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## References

- Adinarayana K.; P. Ellaiah; B. Srinivasulu; R. Bhavani and G. Adinarayana, 2002. Response surface methodological approach to optimize the nutritional parameters for neomycin production by *Streptomyces marinensis* under solid-state fermentation. *Andhra University, Process Biochemistry* 38, 1565-1572
- Ammor, M.S., A.B. Florez, A.H. Van-Hoek, C.G.D.L. Reyes-Gavilan, H.J. Aarts, A. Margolles and B. Mayo, 2008. Molecular characterization of intrinsic and acquired antibiotic resistance in lactic acid bacteria and bifidobacteria. *J. Mol. Microbiol. Biotechnol.*, 14: 6-15.
- Atta, H. M. 2010. Production, Purification, Physico-Chemical Characteristics and Biological Activities of Antifungal Antibiotic Produced by *Streptomyces antibioticus*, AZ-Z710. *American-Eurasian Journal of Scientific Research*. 5 (1): 39-49, 2010.
- Atta, H. M.; A. T. Abul-hamd and H. G. Radwan, 2009. Production of Destomycin-A antibiotic by *Streptomyces* sp. using rice straw as fermented substrate. *Comm. Appl. Biol. Sci*, Ghent University, 74 (3) : 879-897, 2009.
- Becker, B.; M. P. Lechevalier ; R. E. Gordon and H. A. Lechevalier, 1964. Rapid Differentiation between *Nocardia* and *Streptomyces* by paper chromatography of whole cell hydrolysates. *APPL. Microbiol.*, 12: 421 – 423.
- Chapman, G.S. 1952. A simple method for making multiple tests on a microorganism. *J. Bacteriol.* 63:147.
- Cowan, S .T. 1974. Cowan and Steel' s Manual For The Identification Of Medical Bacteria 2<sup>nd</sup>. Edition Cambridge, Univ. Press.
- Edwardss, U.; T. Rogall; H. Bocker; M. Emade and E. Bottger, 1989. Isolation and direct complete nucleotide determination of entire genes. Characterization of a gene coding for 16s ribosomal DNA. *Nucleic Acid Res.* 17: 7843-7853.
- Elwan, S .H.; M. R. El-Nagar and M. S. Ammar, 1977. Characteristics of Lipase(s) in the growth filtrate dialystate of *Bacillus stearothermophilus* grown at 55 °C using a tributryin- cup plate assay. *Bull. Of the Fac. of Sci, Riyadh Univ*, vol .8 : 105 – 119.
- Gordon, R.E. 1966. Some Criteria for The Recognition of *Nocardia madura* (Vincent) Blanchord. *J. General Microbiology*, 45:355-364.
- Gordon, R.E.; D.A. Barnett; J.E. Handehan and C.H. Pang, 1974. *Nocardia coeliaca* , *Nocardia autotrophica* and *Nocardia* Strain. *International Journal of Systematic Bacteriology*. 24:54-63.
- Gupte, M.D. and P.R. Kalkarni, 2000. A study of antifungal antibiotic production by *Streptomyces chattanoogensis* MTCC 3423 using full factorial design. *Lett. Applied Microbiol.*, 35: 22-26.
- Hall, T. A. 1999. BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucleic Acid Symp. Ser* 41: 95-98.
- Hankin, L.; M. Zucker and D.C. Sands, 1971. Improved solid medium for the detection and enumeration of proteolytic bacteria. *Appl. Microbiol.*, 22:205-509.
- Hensyl, W. R. 1994. Bergey's Manual of Systematic Bacteriology 9<sup>th</sup> Edition. John. G. Holt and Stanley, T. Williams (Eds.) Williams and Wilkins, Baltimore, Philadeiphia, Hong kong, London, Munich,
- Hoshino, Y., A. Mukai, K. Yazawa, J. Uno and A. Ando, 2004. Transvalencin A, a thiazolidine zinc complex antibiotic produced by a clinical isolate of *Nocardia transvalensis*. II. Structure elucidation. *J. Antibiot.* ,pp. 57: 803-7
- Jones, K. 1949. Fresh isolates of actinomycetes in which the presence of sporogenous aerial mycelia is a fluctuating characteristics. *J. Bacteriol.*, 57: 141-145.
- Kavanagh, F. 1972. *Analytical Microbiology*. Vol. 2, Acad. Press, New York.
- Kenneth, L.K. and B.J. Deane, 1955. *Color universal language and dictionary of names*. United States Department of Commerce. National Bureau of standards. Washington, D.C., 20234.
- Khalifa, M. A. 2008. Bioprocess Development for the biosynthesis of bioactive compounds from microbial origin. MSc thesis, Faculty of Science, Al-Azhar University, Cairo, Egypt.
- Lazzarini, A., L. Cavaletti, G. Toppo and F. Marinelli, 2000. Rare genera of Actinomycetes as potential producers of new antibiotics. *Antonie van Leeuwenhoek*, 78: 399-405.
- Lechevalier, M.P and H.A. Lechevalier, 1968. Chemical composition as a criterion in the classification of aerobic actinomycetes. *J. Systematic Bacteriology* . 20 : 435-443 .
- Motta A.S.; F. Cladera-Olivera, and A. Brandelli, 2004. Screening for antimicrobial activity among bacteria isolated from the Amazon Basin. *Brazilian J Microbiol.*; 35: 307-310.

24. Nitsh, B. and H.J. Kutzner, 1969. Egg-Yolk agar as diagnostic medium for *Streptomyces* sp., 25:113.
25. Pridham, T.G. and D. Gottlieb, 1948. The utilization of carbon compounds by some actinomycetes as an aid for species determination. *J. Bacteriol.*, 56(1):107-114.
26. Pridham, T.G.; P. Anderson; C. Foley; L.A. Lindenfelser; C.W. Hesselting and R.G. Benedict, 1957. A section of media for maintenance and taxonomic study of *Streptomyces*. *Antibiotics Ann.* pp. 947-953.
27. Sambrook, J.; E. F. Fritsch and T. Maniatis, 1989. *Molecular cloning. A laboratory Manual* Cold Spring Harbor Laboratory press, Cold Spring Harbor, New York, USA.
28. Sanasam, S. and D. Ningthoujam, 2005. Diversity of actinomycetes in selected soils of Manipur and their antibiotic potential. *J. Assam. Sci. Soc.*, 45: 44-47.
29. Sanger, F.; S. Nicklen, and A.R. Coulson, 1977. DNA sequencing with chain terminator inhibitors. *Proc. Natl.Acad. Sci.* 74: 5463-5467.
30. Shearer, M.C., 1997. Methods for the isolation of non streptomycete actinomycete. *J. Ind. Microbiol.*, 28: 1-98.
31. Williams, S.T. 1989. *Bergey's Manual of Systematic bacteriology* Vol. 4, Stanley T., Williams. Williams and Wilkins (Eds.), Baltimore, Hong kong, London, Sydney.
32. Williams, S.T. and F. L. Davies, 1965. Use of antibiotics for selective isolation and enumeration of actinomycetes in soil. *J. Gen. Microbiol.*, 38:251-262.
33. Zitouni, A., H. Boudjella, F. Mathieu, N. Sabaou and A. Lebrihi, 2004a. Mutactimycin PR, a new anthracycline antibiotic from *Saccharothrix* sp. SA 103. I. Taxonomy, fermentation, isolation and biological activities. *J. Antibiotics*, 57: 367-372.
34. Zitouni, A., L. Lamari, H. Boudjella, B. Badji and N. Sabaou, 2004b. *Saccharothrix algeriensis* sp. nov., isolated from Saharan soil. *Int. J. Syst. Evol. Microbiol.*, 54: 1377-1381.

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## Principles for the Teachers of Adults

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**Abstract:** For most adults, being out of the classroom for even a few years can make going back to school intimidating. If they haven't taken a class in decades, it's understandable that they would have some degree of apprehension about what it will be like and how well they'll do. It can be tough to be a rookie when you've been an expert in your field for many, many years. Nobody enjoys feeling foolish. Your job as a teacher of adult students includes being positive and encouraging. Patience helps too. Give your older students time to respond when you ask a question. They may need a few moments to consider their answer. Recognize the contributions they make, even when small. Give them words of encouragement whenever the opportunity arises. Most adults will rise to your expectations if you're clear about them. A word of caution here. Being positive and encouraging is not the same as being condescending. Always remember that your students are adults. Speaking to them in the tone of voice you might use with a child is offensive, and the damage can be very difficult to overcome. Genuine encouragement from one person to another, regardless of age, is a wonderful point of human interaction.

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**Keywords:** adult education, Teacher of Adults

### Introduction:

Adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge. Several definitions of adult education has been done Community

- Adult Education is a [in the following examples are given of them. conscious effort by public institutions or voluntary organizations to promote community awareness comes action.
- adult education teaching is typically specific age group above the legal age] limits as formal and informal, voluntary and at different levels of time, place
- Adult Education is a process in which people who]and education is presented. somehow been cut course they consciously to change or advance their skills in information and do organized activities.
- Adult education includes all formal and informal training and volunteer after] school,

which by experienced educators and aware of the system.

Educational materials on adult education with daily life, needs, goals, aspirations and past experiences of adults and their relationship helps to results learned in life and career are used.

in developed countries, adult education is a form of informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings.

In developing countries and backward because the problems in primary education, lack of resources and facilities, poverty, social existence, economic and cultural concept of adult education is different. In such countries the concept of adult education, literacy education is.

Concept of adult education in revolutionary countries, is a combination of these two concepts. Changes in these countries due to social, political and cultural revolution, resulting from, literacy and continuing education necessary to find because of the revolution, there is cultural poverty on the other hand the implementation of development plans and the need for skilled personnel are expert. General adult education system based on economic conditions - social and cultural community is different and each specific goals will follow. General objectives of adult education and literacy in two categories is divided into professional education.

Literacy goals include:

- Providing primary education in childhood that adults were deprived
- raising awareness for adults;
- knowledge bases and adults about their cultural heritage;
- increase confidence in adults.

Professional education goals include:

- Equipped with the necessary skills to adults living;
- providing the necessary manpower for the country's goals;
- achieving social equality and equity and eliminate the existing differences between different classes.

#### **Adult characteristics:**

to understand the characteristics of adult learners, their mental and physical condition should be considered in the following referred to some of them.

#### **Operating speed:**

slow reaction in adults is natural that necessarily means reducing the logic and practice skills, not due to weakness and increased awareness of natural forces and their skills.

#### **Consciousness:**

no stimulus and incentives encouraging, despite inhibiting stimuli, slow transfer rate, mental, and weak inhibitors of natural forces (mostly visual and auditory) are factors that slow reaction affect individual mental and cognitive activities, but never able to understand, understanding and learning ability (which varies with the speed of learning) is not relevant.

#### **Health:**

what is most age, longer duration is necessary to be heard by listening issue. Why is that when elderly people and old could not hear well, their confidence and vulnerable to the possibility that negative beliefs about their find, they are great. Visual abilities can be like other people, usually decreases with age.

#### **Background of knowledge - skills and beliefs of adults:**

adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation is.

### **Principles for the Teacher of Adults**

#### **Teaching Adult Learners**

The teacher of adults has a different job from the one who teaches children. If you're teaching adult students, it's important to understand the five principles of teaching adults. It's important to know how adults learn. Malcolm Knowles, a pioneer in the study of adult learning, observed that adults learn best when:

1. They understand why something is important to know or do.
2. They have the freedom to learn in their own way.
3. Learning is experiential.
4. The time is right for them to learn.
5. The process is positive and encouraging.

#### **Principle 1: Make Sure Your Adult Students Understand "Why"**

Most adult students are in your classroom because they want to be. Some of them are there because they have Continuing Education requirements to keep a certificate current, but most are there because they've chosen to learn something new.

This principle is not about why your students are in your classroom, but about why each thing you teach them is an important part of the learning. I'll use my own pickle-making lesson as an example.

When I learned to make pickles, my teacher and neighbor, Marilyn, explained:

- It's important to soak the cucumbers in ice water over night. This helps make the pickles crisp.
- If you put a towel under the jars in the canner, they won't bounce against each other and break.
- When sterilizing the jars, it's important to fill each at least halfway with water, AND fill the canner they're sitting in with water. Too little water and the towel mentioned in the previous bullet will catch on fire. You know this kind of information comes from experience.

#### **Principle 2: Respect that Your Students Have Different Learning Styles**

There are three general learning styles: visual, auditory, and kinesthetic.

**Visual** learners rely on pictures. They love graphs, diagrams, and illustrations. "Show me," is their motto. They often sit in the front of the classroom to avoid visual obstructions and to watch you, the teacher. They want to know what the subject looks like. You can best communicate with them by providing handouts, writing on the white board, and using phrases like, "Do you see how this works?"

**Auditory** learners listen carefully to all sounds associated with the learning. "Tell me," is their motto. They will pay close attention to the sound of your voice and all of its subtle messages, and they will actively participate in discussions. You can best communicate with them by speaking clearly, asking questions, and

using phrases like, “How does that sound to you?”

**Kinesthetic** learners need to physically do something to understand it. Their motto is “Let me do it.” They trust their feelings and emotions about what they’re learning and how you’re teaching it. They want to actually touch what they’re learning. They are the ones who will get up and help you with role playing. You can best communicate with them by involving volunteers, allowing them to practice what they’re learning, and using phrases like, “How do you feel about that?”

Pickle Example: I’m generally a kinesthetic learner. Marilyn talked to me about her pickling process, explaining why she uses the ingredients she does, and showed me how she dips a liquid measuring cup into the hot brine and pours it into the jar using a wide-mouthed funnel, but my greatest learning came when I fumbled through the second jar all by myself.

Most people use all three styles while they’re learning, and of course, this is logical since we all have five senses, barring any disabilities, but one style almost always is preferred.

The big question is, “How do you, as the teacher, know which student has which learning style?” Without training in neuro-linguistics, it might be difficult, but conducting a short learning style assessment at the beginning of your class would benefit you and the students. This information is as valuable to the student as it is to you.

There are several learning style assessments available online, some better than others. I like the one at Ageless Learner.

Share your thoughts about learning styles.

### **Principle 3: Allow Your Students to Experience what they’re learning**

Experience can take many forms. Any activity that gets your students involved makes the learning experiential. This includes small group discussions, experiments, role playing, skits, building something at their table or desk, writing or drawing something specific – activity of any kind. Activities also keep people energized, especially activities that involve getting up and moving about.

The other aspect of this principle is honoring the life experiences your students bring to the classroom. Be sure to tap into that wealth of wisdom whenever it’s appropriate. You’ll have to be a good timekeeper because people can talk for hours when asked for personal experiences, but the extra facilitation needed will be well worth the gems your students have to share. Pickle Example: Once Marilyn had shown me how to prepare one jar, she busied herself in the kitchen doing her own thing, close enough to keep an eye on me and to answer my questions, but allowing me the autonomy to go at my own speed. When I made mistakes, she didn’t interfere unless I asked. She gave me the space and the time to correct them on my own.

### **Principle 4: When the Student Is Ready, the Teacher**

### **Appears**

“When the student is ready, the teacher appears” is a Buddhist proverb packed with wisdom. No matter how hard a teacher tries, if the student isn’t ready to learn, chances are good he or she won’t. What does this mean for you as a teacher of adults? Luckily, your students are in your classroom because they want to be. They’ve already determined that the time is right.

It’s your job to listen carefully for teaching moments and take advantage of them. When a student says or does something that triggers a topic on your agenda, be flexible and teach it right then. If that would wreak havoc on your schedule, which is often the case, teach a bit about it rather than saying flat out that they’ll have to wait until later in the program. By then, you may have lost their interest.

Pickle Example: My mom canned pickles all during my childhood years, but I had no interest in participating, or even in eating them, sadly. Several years ago, I helped Marilyn can pickles, and even then, I was simply helping and not really learning. When I finally started enjoying pickles and planted my own cucumbers, then I was ready to learn, and Marilyn was right there to teach me.

### **Principle 5: Encourage Your Adult Students**

For most adults, being out of the classroom for even a few years can make going back to school intimidating. If they haven’t taken a class in decades, it’s understandable that they would have some degree of apprehension about what it will be like and how well they’ll do. It can be tough to be a rookie when you’ve been an expert in your field for many, many years. Nobody enjoys feeling foolish.

Your job as a teacher of adult students includes being positive and encouraging. Patience helps too. Give your older students time to respond when you ask a question. They may need a few moments to consider their answer. Recognize the contributions they make, even when small. Give them words of encouragement whenever the opportunity arises. Most adults will rise to your expectations if you’re clear about them.

A word of caution here. Being positive and encouraging is not the same as being condescending. Always remember that your students are adults. Speaking to them in the tone of voice you might use with a child is offensive, and the damage can be very difficult to overcome. Genuine encouragement from one person to another, regardless of age, is a wonderful point of human interaction.

Pickle example: I’m a worrier. I worried about spilling brine all over Marilyn’s stove, about dropping the full jars as I lifted them out of the hot bath, about making a mess of her kitchen. Marilyn assured me that spills were easily cleaned up, especially when vinegar was involved since it’s used for cleaning anyway! She encouraged me as I gingerly moved boiling hot jars. Throughout the

pickle-making process, Marilyn remained calm, unruffled. She paused by me every once in a while to comment, "Oh, don't they look beautiful!"

Because of Marilyn's understanding of how to teach me, her adult student, the art of making dill pickles, I now have the confidence to make them in my own kitchen, and I can't wait for my next batch of cucumbers to be ready.

This is your challenge as a teacher of adults. Beyond teaching your subject, you have the opportunity to inspire confidence and passion in another human being. That kind of teaching changes lives.

### Conclusion:

Material often set different types of materials and educational content in books and pamphlets, books, training guides, trainers, equipment auxiliary audio, visual and material are included such that during actual teaching sessions, are used in the transmission and content but also to achieve the goals of making education programs are important.

Additional material for the next stage of learning often means to be expected when developing your trip experiences for learners or transfer is provided, develop knowledge, insight and skills they will.

To ensure that science curriculum and educational aspects, according to community needs and audiences, application form is provided or not, the content selection criteria should be considered. These criteria is being include knowledge, effectiveness, flexibility, diversity, relevance and practical learning.

Some research findings that can be a learning process for the Guidelines for training operations are applied, is given below:

1- Preparation for adults to learn how much he depends on previous learning. Knowledge that has accumulated because of an ability to absorb new information more person is. Past educational experience features a diverse group of adult learners, the starting point of any activity on the diversity training is emphasized.

2- intrinsic motivation, learning a deeper and make them sustainable. When the need is met directly by the learning itself, what is learned, but is complementary learning. Creating a training activity in adult learning needs, learning ensures stable

3- Positive reinforcement (reward) learning to reinforce the negative (punishment) is more effective. Many adults because of negative experiences at the beginning of schooling, are weak and afraid. Feeling of success in adult learning for continuous learning and adult participation is essential.

4- To maximize learning, information must be provided an organized manner. Entries can be simple or complex can be arranged around related concepts are organized. Starting point for organizing content knowledge for

adults and adults is linked to past experiences

5- Learning, especially regarding skills development, will be added frequently.

### Reference:

1. Brookfield, S.D. (1997). *Developing Critical Thinkers: Challenging Adults to Explore Alternative Ways of Thinking and Acting*. San Francisco: Jossey-Bass.
2. Budin, H. (1999). The computer enters the classroom. *Teachers College Record*, 100, 656-669.
3. Cranton, P. (1996). *Professional Development as Transformative Learning*. San Francisco: Jossey-Bass.
4. Creighton S. (2000). Participation trends and patterns in adult education: 1991-1999. United States: National Center for Education Statistics.
5. Egan, K. (1992). *Imagination in Teaching and Learning*. Chicago: University of Chicago Press.
6. Fletcher, W. E., & Deeds, J. P. (1994). Computer anxiety and other factors preventing computer use among United States secondary agricultural educators. *Journal of Agricultural Education*, 35(2), 16-21.
7. Frye, N. (1993). *The Educated Imagination*. Toronto: Canadian Broadcasting Corporation.
8. Ginsburg, L. (1998). Integrating technology into adult learning. In C. Hopey (Ed.), *Technology, basic skills, and adult education: Getting ready and moving forward* (Information Series No. 372, pp. 37- 45). Columbus, OH: Center on Education and Training for Employment. (ERIC Document Reproduction Service No. ED 423 420).
9. Ginsburg, L., & Elmore, J. (2000). *Captured wisdom: Integrating technology into adult literacy instruction*. Naperville, IL: North Central Regional Education Laboratory. (ERIC Document Reproduction Service No. ED 454 408).
10. Glenn, A. D. (1997). Technology and the continuing education of classroom teachers. *Peabody Journal of Education*, 72(1), 122-128.
11. Habermas, Jurgen. (1991). *Knowledge and Human Interests*. Boston: Beacon Press.
12. Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
13. Kim K. (2000). Participation in adult education in the United States, 1998-1999. U.S. Dept. Of Education, Office of Educational Research and Improvement.
14. King, K. P. (1999). Unleashing technology in the classroom: What adult basic education teachers and organizations need to know. *Adult Basic Education*, 9(3), 162-175.
15. King, K. P. (2003). Learning the new technologies: Strategies for success. In K. P. King & P. Lawler (Eds.), *New perspectives on*

- designing and implementing professional development of teachers of adults. New directions for adult and continuing education (Vol. 98, pp. 49-57). San Francisco: Jossey-Bass.
16. Knowles, M. S. (1992). *The modern practice of adult education, andragogy versus pedagogy*. Author of the *Classic Informal Adult Educator*, 3rd Edn. New York: Association Press.
  17. Knowles, M. S. (1994). *Andragogy in action: Applying modern principles of adult learning*. San Francisco: Jossey-Bass Inc. Pub.
  18. Knowles, M. S. (1999). *The making of adult educator: An autobiographical journey*. 1st Edn. San Francisco: Jossey-Bass Inc. Pub.
  19. Kolb, David A. (1993). *Experiential learning: Experience as the source of learning and development*. 1st Edn. United States: FT Press.
  20. Kotlik, J.W., & Smith, M. N. (1999). Computer anxiety levels of vocational agriculture and other vocational teachers. In M. F. Burnett (Ed.), *Proceedings, national agricultural education research meeting* (pp. 1-9). Columbus, OH: American Association for Agricultural Education.
  21. Krajnc, A. (1999). *Andragogy*. In Collin, J. T. (Ed.), *Lifelong education for adults: An international handbook*. 1st Edn. New York: Pergamon Press.
  22. Lang, J. M. (1998). *Technology in adult basic and literacy education: A rationale and framework for planning* (Research report). Cheney: Eastern Washington University, Instructional Media and Technology. Retrieved on November 14, 2003, from <http://cehd.ewu.edu/education/GraduateExamples/JML98Educ601.html>
  23. Jordan, W. R., & Follman, J. M. (1993). *Using technology to improve teaching and learning. Hot topics: Usable research*. Palatka, FL: Northeast Florida Educational Consortium, Southeastern Regional Vision for Education. (ERIC Document Reproduction Service ED 355 930).
  24. Mazanah Muhamad & Associates. (2001). *Adult and continuing education in Malaysia*. 1st Edn. Kuala Lumpur: Universiti Putra Malaysia.
  25. Merriam, S.B., Baumgarther, L.M., & Caffarella, R.S. (1999). *Learning in adulthood: A comprehensive guide*. 2nd Edn. San Francisco: Jossey-Bass Pub.
  26. Mezirow, Jack and Associates (Eds.) (1990). *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Education*. San Francisco: Jossey-Bass.
  27. Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth.
  28. Office of Technology Assessment, U.S. Congress. (1993). *Adult literacy and new technologies: Tools for a lifetime* (Final Report No. OTA-SET-550). Washington, DC: Government Printing Office.
  29. Neculau, A. (2004). *The adults' education: Romanian experiences*. Iasi, Polirom Publishing House.
  30. Norzaini Azman. (2006). *History, trends and significant development of adults education in Malaysia in HISTORIA: Journal of Historical Studies*. Vol. VII, No. 2. Bandung: Historia Utama Press.
  31. Pratt, D.D. (1993). *Andragogy after twenty-five years: New directions for adult and continuing education*. Journal Articles. San Francisco: Jossey-Bass Inc. Pub.
  32. Olgren, C. H. (2000). *Learning strategies for learning technologies*. In E. J. Burge (Ed.), *The strategic use of learning technologies. New directions in adult and continuing education* (Vol. 88, pp. 7-16). San Francisco: Jossey-Bass.
  33. Sava, S. (2001). *Adults' education in Romania: Educational, cultural and social politics. The volume of the first National Conference on Adults' Education*, Timisoara, The Almanack of Banat Printing House.
  34. Schifirnet C. (1997). *Changing Adults' Education*. Bucharest, Fiat Lux Printing House.
  35. Sutton-Smith, Brian. (1988). *In Search of the Imagination*. In K. Egan and D. Nadaner (Eds.), *Imagination and Education*. New York, Teachers College Press.
  36. UNESCO. (1999). *The Hamburg Declaration. Fifth international conference on adult education (Confitea V)*. Paris: UNESCO
  37. Williams, Oscar. (Ed.) (1990). *A Little Treasury of Modern Poetry* (3rd Edition). New York: Charles Scribner's.

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霍金用狄拉克海的虚粒子对来解释是有点故弄玄虚。也不符合宇宙的实际情况。

5; 证明了任何一个黑洞的霍金辐射  $m_{ss}$  的信息量  $I_0 = h/2\pi =$  基本单元信息量 = 最小黑洞  $M_{bm}$  和普朗克粒子  $m_p$  的信息量(63a), 而与黑洞的总质能量  $M_b$  和  $m_{ss}$  的大小无关。推导出来黑洞的总信息量的新公式  $I_m = 4GM_b^2/C(63d)$ 。

6; 推导出黑洞发射一个  $m_{ss}$  的间隔时间  $-d_b \approx 3 \times 10^{-27} M_b h C / 8 G \approx 0.356 \times 10^{-36} M_b$

7; 推导出黑洞  $m_{ss}$  的波长  $\lambda_{ss} = 2C t_s = 2R_b$ ,

8; 假设在我们宇宙诞生前, 前辈宇宙有一次大塌缩, 其最后的塌缩规律近似于我们宇宙诞生时的规律, 推导出公式:  $t^{3/2} t [k_1 (2G)/C^5]^{2/3}$ , 由此计算出当前前辈宇宙大塌缩到  $t_m = 0.5563 \times 10^{-43} s$  时, 形成了粒子之间和粒子内部的引力断链, 立即成为  $M_{bm} = m_p$  在普朗克领域的爆炸消亡, 而不是‘奇点’。其残骸物必定的重新聚集结合成为新的  $M_{bm} = m_p$ , 它们的出现就是我们新宇宙的诞生。新的极大量的  $M_{bm} = m_p$  的合并造成了宇宙的‘原初暴涨’, 和直到现在的宇宙膨胀。

9; 作者用新的简单原理论证了我们宇宙的‘原初暴涨 (Original Inflation)’, 并证明了宇宙现在的膨胀就是那极大量的原初最小黑洞  $M_{bm} = m_p$  不断地合并的结果。<sup>[2]</sup>

10; 完全的证明了我们现在膨胀的宇宙就是一个真实的宇宙大大黑洞。哈勃定律就是那极大量的原初最小黑洞  $M_{bm} = m_p$  合并所造成的膨胀规律。因此, 宇宙的生长衰亡的规律就可以按照黑洞的规律来论证。黑洞是封闭的, 只有一个由其质能  $M_b$  所唯一规定的密度  $\rho_b$ 。对黑洞来说, 只能是  $\Omega = 1$ 。因此科学家们 60 多年来, 用弗里德曼模型所定义的  $\Omega$  去判断宇宙是开放还是封闭, 实际上是一个伪命题。

结论: A; 从前黑洞的性能参数只有  $M_b$  与  $R_b$ ,  $T_b$  的 2 种关系, 无法解决黑洞性能参数的互相关联的重要问题, 特别是不知  $m_{ss}$  为何物。在作者推导出来了上述的许多新结论和公式后, 基本上明确地解决了由于霍金疏忽而没有解决的一些有关黑洞性质的重大问题, 由作者的新公式的补充而确定黑洞  $M_b$  与其它参数  $R_b$ ,  $T_b$ ,  $m_{ss}$ ,  $I_m$  和  $S_{BM}$  的单一的线性关系。也确定了霍金辐射  $m_{ss}$  与其它参数  $M_b$ ,  $T_b$ , 波长  $\lambda_{ss}$ , 信息量  $I_0 = h/2\pi$  和其熵  $S_{Bbm} = \pi$  的确定关系。B; 认清了  $m_{ss}$  各方面的性质。比如, 我们宇宙黑洞的霍金辐射  $m_{ss}$ , 其波长正好等于宇宙球体的直径, 那不就是引力波吗? C; 将  $M_{bm} = m_p$  和其信息量  $I_0$  也联系起来。就是说, 上面已经基本上解决了史瓦西黑洞的问题。简单、彻底、直接否定了广义相对论方程中出现‘奇点’的谬误。至于黑洞的另外 2 个参数, 角动量和电荷, 由于其不对称平衡度不大, 所以对史瓦西黑洞并无太大的、实质性的影响。什么‘裸奇点’可能只是数学上的游戏, 可能缺乏实际的意义。

【作者几句简单的话】。作者深信: 对科学的真知灼见常常来源于繁碎的数值计算。作者在文中主要是根据霍金的一些黑洞理论和公式, 再加上几个经典理论的公式, 来推导和计算验证出新公式, 如(1d), (1e), (63a), (63d) 和表 2 等, 相信能经得起未来时间和实践的考验, 也相信简单明确地解决了黑洞和宇宙学中的某些重大的实际问题, 比如‘奇点’与黑洞的命运和宇宙起源, 黑洞信息量等。因文中没有复杂的数学公式和玄奥的理论, 在主流学者和大师们的眼里, 会不屑一顾, 作者也未指望会得到毕生研究广义相对论学者们的承认和支持。像大学生做作业一样, 作者的新观念、新公式、新结论, 一切都是简单明了的。人们很容易判断其对错优劣, 并与实际情况和观测数据作对比, 作出结论。作者诚恳的希望各位对文章的错误和缺点进行批判和指正。

### 第一篇 对黑洞物理学中的一些新观点和新发展。

==简单直接地否定了黑洞内有‘奇点’的谬论==

在本文中, 只研究无旋转、无电荷、球对称的引力黑洞, 即史瓦西黑洞。

【一】。对黑洞的霍金辐射  $m_{ss} M_b = hC/8 G = 1.187 \times 10^{-10} g^2$  和最小黑洞  $M_{bm}$  普朗克粒子  $m_p = (hC/8 G)^{1/2} = 1.09 \times 10^{-5}$  克简单直接地的证明。

下面  $M_b$ —黑洞的总质能量;  $R_b$ —黑洞的视界半径,  $T_b$ —黑洞的视界半径  $R_b$  上的温度,  $m_{ss}$ —黑洞在视界半径  $R_b$  上的霍金辐射,  $h$ —普朗克常数 =  $6.63 \times 10^{-27} g \cdot cm^2/s$ ,  $C$ —光速 =  $3 \times 10^{10} cm/s$ ,  $G$ —万有引力常数 =  $6.67 \times 10^{-8} cm^3/s^2 \cdot g$ , 波尔兹曼常数 =  $1.38 \times 10^{-16} g \cdot cm^2/s^2 \cdot k$ ,  $L_p$ —普朗克长度;  $T_p$ —普朗克温度;  $R_{bm}$ ,  $T_{bm}$  分别是最小黑洞  $M_{bm}$  的视界半径

$R_{bm}$  和视界半径上的温度  $T_{bm}$ ; 下面是霍金黑洞的温度公式,

$$T_b M_b = (C^3/4G) \times (h/2) 10^{27} gk \quad (1a)$$

$m_{ss}$  既然是量子辐射, 在视界半径  $R_b$  上的  $m_{ss}$ , 按引力能转换为辐射能的熵温公式,

$$m_{ss} = T_b / C^2 \quad (1b)$$

$$GM_b / R_b = C^2 / 2 \quad (1c)$$

从 (1a) 和 (1b), 很容易得出下式,

$$m_{ss} M_b = hC/8 G = 1.187 \times 10^{-10} g^2 \quad (1d)$$

公式 (1d) 是黑洞的视界半径  $R_b$  上普遍有效的

公式。既然  $m_{ss}M_b$  为常数, 根据热力学定律, 必定有  $T_b \neq 0$ , 因此,  $m_{ss} \neq 0$ ,  $M_b \neq 0$ , 因而  $m_{ss}$  和  $M_b$  都不可能是无限大和零。就是说,  $m_{ss}$  和  $M_b$  都必定有个极限。同样, 按照(1a)、(1b)、(1c)式,  $T_b$ 、 $R_b$  也都不可能是无限大和零, 都必定有个极限。再根据部分不可能大于全体的公理。这个极限就是最大的  $m_{ss}$  等于最小的  $M_{bm}$ , 即是  $M_b = M_{bm} = m_{ss}$ 。从(1d)可得, 再从量子引力论得知  $(hC/8G)^{1/2} = m_p =$  普朗克粒子, 于是, 最小黑洞  $M_{bm}$  为,

$$m_{ss} = M_{bm} = (hC/8G)^{1/2} = m_p = 1.09 \times 10^{-5} \text{g} \quad (1e)$$

$$m_{ss} R_b = h/(4C) \quad (1f)$$

$$R_{bm} = L_p^{[3]} (Gh/2C^3)^{1/2} = 1.61 \times 10^{-33} \text{cm} \quad (1g)$$

$$T_{bm} = T_p^{[3]} = 0.71 \times 10^{32} \text{k} \quad (1h)$$

$$R_{bm} m_{ss} = h/(4C) = 1.0557 \times 10^{-37} \text{cmg} \quad (1i)$$

最小黑洞  $M_{bm}$  的康普顿时间 Compton time  $t_c =$  史瓦西时间  $t_s$ ,

$$t_c = t_s = R_{bm}/C = 1.61 \times 10^{-33}/3 \times 10^{10} = 0.537 \times 10^{-43} \text{s} \quad (1j)$$

$$\rho_{bm} \approx 10^{93} \text{g/cm}^3 \quad (1k)$$

从  $M_b = 4 R_b^3/3$  和(1c), 对于任何一个黑洞, 下面的(1n)总是有效的。

$$\rho_b R_b^2 = 3C^2/(8G) = \text{constant} \quad (1n)$$

【二】. 如何理解当黑洞因发射霍金辐射  $m_{ss}$  而最后收缩为最小黑洞  $M_{bm} =$  普朗克粒子  $m_p$  时, 会必然在普朗克领域爆炸消失, 而不会继续收缩成为‘奇点’呢?

按照公式(1d),  $m_{ss}M_b = hC/8G = 1.187 \times 10^{-10} \text{g}^2$ , 当黑洞  $M_b$  无外界能量-物质可被吞噬, 而不停地发射  $m_{ss}$  时,  $M_b$  只能相应地不停地减少, 直到最后成为最小黑洞  $M_{bm}$ ,

$$m_{ss} = M_{bm} = (hC/8G)^{1/2} = m_p = 1.09 \times 10^{-5} \text{g} \quad (1f)$$

为什么最小黑洞  $M_{bm}$  刚好完全等于普朗克粒子  $m_p$ ? 这个问题很难回答, 因为人们对普朗克领域也许永远无法观察和测量。正因为如此, 所以科学家们才提出许多无法直接验证而玄奥的理论, 如弦论、膜论、多维理论等。但是, 有一点也许可以确定, 此时物质粒子已经不存在, 而完全彻底地量子化为能量了。所以,  $M_{bm}$  是我们宇宙中可能出现的最小黑洞。而普朗克粒子  $m_p$  是普朗克领域可能出现的最大能量粒子。因此,  $M_{bm} = m_p$  就可能是我们宇宙和普朗克领域这 2 个世界之间的‘临界点’, 它们不可能独立地存在于任何一个世界。正如‘冰点’是固态冰的最高温度, 而是液体水的最低温度一样。

1\*. 一旦黑洞  $M_b$  收缩到  $M_{bm}$ , 于是达到,

$$M_{bm} C^2 = m_{ss} C^2 = T_b = 10^{16} \text{erg} \quad (2a)$$

$$M_{bm} C^2 / T_b = m_{ss} C^2 / T_b = 1 \quad (2b)$$

可见,  $M_{bm}$  已经整体成为一个完全孤立的能量粒子, 根本没有多一点引力能量再转变为霍金辐射能  $m_{ss}$ , 因此, 只有将整体  $M_{bm} = m_{ss}$  爆炸成高能

的  $\gamma$  辐射能。

2\*. 作为最小黑洞  $M_{bm}$ , 如果再继续收缩, 就必然要使得  $m_{ss} > M_{bm}$ , 这不可能。如果再发射  $m_{ss} < M_{bm}$ , 也不可能。这都违反黑洞公式(1d)和(1e), 都只能爆炸解体消亡。

3\*. 按照量子力学的测不准原理-- Uncertainty Principle,

$$\Delta E \times \Delta t \approx h/2 \quad (2c)$$

对于  $M_{bm}$ , 其  $\Delta E = M_{bm} C^2 = T_b = 10^{16} \text{erg}$ , 其  $\Delta t = 2$  康普顿时间--2 Compton time = 2 史瓦西时间  $t_s = 2R_{bm}/C = 2 \times 1.61 \times 10^{-33}/3 \times 10^{10} = 1.074 \times 10^{-43} \text{s}$ 。

$\Delta E \times \Delta t = 10^{16} \times (2 \times 0.537 \times 10^{-43}) = 1.074 \times 10^{-27}$ , 但是  $h/2 = 6.63 \times 10^{-27}/2 = 1.06 \times 10^{-27}$ 。就是说, 如果  $M_{bm} = m_p$  再继续收缩下去的话, 就必然使得  $\Delta E \times \Delta t < h/2$ , 这违反了 Uncertainty Principle。因此, 只能爆炸解体消失在普朗克领域,  $M_{bm}$  不可能存在, 根本不可能继续塌缩成为‘奇点’。

4\*.  $M_{bm} = m_p$  的信息量  $I_0 = h/2 =$  最小的信息量。无法再小了。

【三】. 黑洞最重要的本质属性, 一旦一个黑洞形成之后, 不管它是因吞噬外界质能量而膨胀(见公式(3a)), 还是因发射霍金辐射而缩小(见公式(3a)), 在其最后成为最小黑洞  $M_{bm} =$  普朗克粒子  $m_p$ , 而爆炸消失在普朗克领域之前, 他会永远是一个黑洞。黑洞是宇宙中最简单的实体。

按照史瓦西对广义相对论方程的特殊解(1c),

$$R_b = 2GM_b/C^2, \quad (1c)$$

$$C^2 dR_b = 2GdM_b$$

$$C^2 (R_b \pm dR_b) = 2G(M_b \pm dM_b) \quad (3a)$$

假设有另外一个黑洞  $M_{ba}$  与黑洞  $M_b$  合并或者碰撞,

$$C^2 R_{ba} = 2GM_{ba} \quad (3b)$$

从(3a) + (3b) + (1c), 结果,

$$C^2 (R_b + R_{ba} \pm dR_b) = 2G (M_b + M_{ba} \pm dM_b) \quad (3c)$$

从公式(1a)(1b)(1c)(1d)可知, 黑洞在吞噬外界能量-物质时,  $M_b$  增加,  $R_b$  增加,  $T_b$  减少,  $m_{ss}$  减小; 在发射  $m_{ss}$  后,  $M_b$  减少,  $R_b$  缩小,  $T_b$  升高,  $m_{ss}$  增大。

从公式(1a)、(1b)、(1c)、(1d)看, 黑洞  $M_b$  与其它性能参数  $T_b$ 、 $R_b$ 、 $m_{ss}$  之间的关系都是简单的单值的线性关系。因此, 黑洞是宇宙中最简单的实体。

【四】. 黑洞  $M_b$  发射霍金量子辐射  $m_{ss}$  的机理。下面可以用牛顿力学求出霍金辐射粒子  $m_{ss}$  在黑洞  $M_b$  的视界半径  $R_b$  上的瞬时热动力平衡。并由此得知, 由于  $m_{ss}$  在视界半径上的热运动, 它可以在其震动的波谷的能量最小时, 摆脱黑洞引力的束缚而暂时逃出黑洞, 这就是黑洞的霍金辐射的机理, 与辐射能量逃出



太阳等天体的机理是相同的。都是由高温向低温、由高能位向底能位的自然流动。

**【1】**。下面(4a)是气体的热力学平衡公式，(4b)是气体的状态方程，(4c)是球体公式，P是粒子 $m_s$ 在R处的热压力。M是R球体内的总质量， $\rho$ 是R内的平均密度，T是R末端的温度。

根据牛顿力学和热力学平衡式，任意一团R球内的物质粒子M，粒子 $m_s$ 在R端处，

$$dP/dR = -GM/R^2 \quad (4a)$$

$$P = n T = T/m_s \quad (4b)$$

$$M_b = 4 R_b^3/3 \quad (4c)$$

将上面的(4b)、(4c)式代入(4a)，再将黑洞的(1a)、(1c)式也代入(4a)求解，就可得出粒子 $m_s$ 在黑洞视界半径 $R_b$ 上的热力学平衡，

$$\text{左边 } dP/dR = d[3hC^3/(32 GR^3 m_s)]/dR = -(9hC^3)/(32 \cdot 2Gm_s R^4) \quad (4e)$$

$$\text{右边 } -GM/R^2 = -(GM/R^2) \times (3M/4 R^3) = -(3G/4 R^3) \times (M^2/R^2),$$

由(1c)、 $M_b/R_b = C^2/2G = M/R$ 。故，

$$-GM/R^2 = -3C^4/(16 GR^3), \quad (4f)$$

于是(4e) = (4f)，即  $-(9hC^3)/(32 \cdot 2Gm_s R^4) = -3C^4/(16 GR^3)$ ，

$$\text{即得， } 3h/(2 m_s R^4) = C/R^3$$

$$R = 3h/(2 C m_s),$$

$$\text{或者 } R m_s = 3h/(2 C) = 1.0557 \times 10^{-37} \text{ cmg} \quad (4g)$$

当令  $m_s = 6 m_{ss}$  时，代入(4g)式，得出，

$$QR_b m_{ss} = h/(4 C) = 1.0557 \times 10^{-37} \text{ cmg} \quad (4h)$$

$$\text{由此得出 (4h) (4f),} \quad (4i)$$

由(4i)式可知，黑洞 $M_b$ 在视界半径 $R_b$ 上发射的霍金辐射是 $m_{ss}$ ，而不是 $m_s$ 。之所以 $m_s = 6 m_{ss}$ ，是因为在解(4a)时，代入的(4b)和(4c)式中的密度和温度T是用R球内的平均值，这样，在R端处所得出的 $m_s$ 值，就比实际的 $m_{ss}$ 大得多，即 $m_s = 6 m_{ss}$ 。这足以证明 $m_{ss}$ 在 $R_b$ 上的热力学平衡与任意一团物质粒子 $m_s$ 在R处的热力学平衡的机理是相同的。

但是，由于 $m_{ss}$ 在 $R_b$ 上的热运动，其瞬时震荡的温度和动能有微小的波动，它就有瞬时离开 $R_b$ ，从高位高能流向外界低温低能。但黑洞因失去一个 $m_{ss}$ 而缩小 $R_b$ 和增高 $T_b$ 。由于 $R_b$ 上能阶(位)的升高，滞留在外界的哪个 $m_{ss}$ 就回不来了。这就是用经典理论来解释黑洞发射霍金辐射的机理。霍金用狄拉克海中的虚粒子对来解释黑洞发射霍金辐射，是故弄玄虚，也较牵强附会。因为宇宙中有不同大小的黑洞 $M_b$ ，其 $m_{ss}$ 相差极大，而且黑洞因吞噬外界能量-物质或发射霍金辐射而随时在巨变，这就要求虚粒子对也跟着 $m_{ss}$ 而随时改变其大小，这怎么可能呢？

**【2】**。3种能量形式的转换

$$m_{ss} C^2 = \kappa T_b = Ch/2 \lambda = v h/2 \quad (4j)$$

从前面的论证中已经知道，黑洞的霍金辐射 $m_{ss}$ 在其视界半径 $R_b$ 上，是遵守(4j)式的。现在将太

阳表面温度 5,800k 作为阈温  $T_b$  来看，即令  $T_b = 5,800k$ ，其辐射能相对应的质量  $m_{sf}$  为， $m_{sf} = \kappa T_b/C^2 = 10^{-33}g$ 。因此， $m_{sf}$  所对应的辐射能的波长  $\lambda_{sf} = h/(2 C m_{sf}) = 10^{-5}cm = 10^{-7}m$ 。这就表明太阳所发射的辐射能的波长 $\lambda_{sf}$ 只能是 $<10^{-7}m$ ，这就是太阳向外发射电磁波、可见光和无线电波的原因。而 $10^{-7}m$ 是紫外线的外端而近于X射线。所以太阳是较少发射高能量的X射线和难发射 $\gamma$ 射线的。这表明2者(黑洞和太阳)向外发射热辐射的机理是相同的，都取决于其界面的温度T，即阈温。当然，由于太阳内层有时有强烈的各种反应而产生爆炸，会喷射出各种高能粒子或者辐射。其实，大黑洞也有类似的情况，向外喷射出高能粒子或者辐射。所以，在本质上，黑洞极其近似于白矮星和黑矮星。

**【五】**。黑洞的寿命  $\tau_b$ 。按照霍金黑洞的寿命公式， $\tau_b \approx 10^{-27} M_b^3$  (5a)

对于最小黑洞  $m_{ss} = M_{bm} = m_p = 1.09 \times 10^{-5}g$ ，其寿命  $\tau_{bm} \approx 10^{-42}$ 秒  $\approx$  其史瓦西时间  $t_s$ ，见(1j)，二者在同一个数量级。对于恒星级黑洞  $M_{bs} \approx 6 \times 10^{33}g$ ，其  $\tau_{bs} \approx 10^{66}$ 年。对于我们宇宙大黑洞，其  $M_{bu} \approx 10^{56}g$ ，其寿命  $\tau_{bu} \approx 10^{133}$ 年。由此可见，

1\*；以宇宙作为黑洞(证实宇宙是真实的黑洞的证明见后面)来判断其命运，其结论与广义相对论的弗里德曼模型是决然不同的。

2\*；黑洞是对外界能量-物质贪得无厌的掠夺者。

从公式(1d)看，对于最小黑洞  $m_{ss} = M_{bm} = m_p = 1.09 \times 10^{-5}g$ ，恒星级黑洞  $M_{bs}$  的  $m_{ss} = 10^{-44}g$ 。对于我们宇宙大黑洞  $M_{bu}$  的  $m_{ssu} \approx 10^{-66}g$ 。因为宇宙中不存在小于恒星级黑洞  $M_{bs}$  的小黑洞，其发射  $m_{ss}$  和  $m_{ssu}$  是如此之微弱，而宇宙中的能量-物质的质量均大于  $m_{ss}$ ，而易于被黑洞吞噬。因此，黑洞在人们眼中，就成为贪得无厌的掠夺者，直到将其外围的所有能量-物质吞噬完为止，然后再向外慢慢吞吞地、一个个地发射极其微弱的霍金辐射。

3\*；小黑洞吃掉大黑洞。当大黑洞  $M_{bb}$  内有小黑洞  $M_{bl}$  时，因为2者向外发射的霍金辐射都很微弱，所以， $M_{bl}$  先吃掉  $M_{bb}$  内所有的能量-物质后，而变成一个  $(M_{bb} + M_{bl})$  的大黑洞。然后，其生长衰亡的规律按照  $(M_{bb} + M_{bl})$  大黑洞运行。

**【六】**。黑洞  $M_b$  和其霍金辐射  $m_{ss}$  信息量  $I_b$  和熵  $S_{Bb}$ 。第一 无论  $M_b$  和  $m_{ss}$  的大小  $m_{ss}$  的信息量  $I_o = h/2 =$  最小黑洞  $M_{bm}$  和普朗克粒子  $m_p$  的信息量 = 宇宙中最小的信息量=1比特，其熵  $S_{Bbm} = \pi$ 。第二；黑洞  $M_b$  的总信息量  $I_m = I_o M_b/m_{ss} = 4GM_b^2/C$  其总熵  $S_{BM} = (I_o) I_m = (I_o) \times 4GM_b^2/C = 2^2 R_b^2 C^3/hG$ 。

**【1】**；按照黑洞物理中的热力学类比，爱因斯坦引力理论中的黑洞熵  $S_B$  可写为，

$$S_B = A/4l^2 \quad (2) = 2^2 R_b^2 C^3/hG \quad (6a)$$

上式中, A为黑洞面积,  $A = 4\pi R_b^2$ 。l 为普朗克长度,

$$l = (HG/C^3)^{1/2} \quad (6b)$$

(6a)式即有名的 Bekenstein-Hawking公式。再从史瓦西公式(1c),  $GM_b/R_b = C^2/2$ ,  $S_B = A/4l^2 = 4\pi R_b^2/(4HG/C^3) = 4\pi R_b^2 \times C^3/4GH = \pi R_b R_b C^3/GH = \pi \times C t_s \times 2GM_b C^3/GHC^2 = \pi 2t_s \times M_b C^2/H$ ,  $t_s$  为光穿过黑洞的史瓦西半径 $R_b$ 的时间。于是有,

$$S_B \times (h/2\pi) = \pi(2t_s \times M_b C^2), \quad S_B = \pi(2\pi/h) \times (2t_s \times M_b C^2) \quad (6c)$$

在上面(6c)式中,  $H \equiv (h/2\pi) = I_0$ , 海森伯测不准原理说, 互补的两个物理量, 比如时间和能量, 位置和动量, 角度和角动量, 无法同时测准。它们测不准的乘积等于某个常数, 那个常数就是普朗克常数, 即是  $h = 6.63 \times 10^{-34}$  焦耳秒  $= 6.63 \times 10^{-27} g \cdot cm^2/s$ 。于是,

$$2t_s \times M_b C^2 = h/2\pi = I_0 \quad (6d)$$

$$\Delta E \times \Delta t \quad h/2 = I_0 \quad (6e)$$

对比(6d)和(6e), (6e)式即是测不准原理的数学公式, 可见,  $2t_s$  对应于  $\Delta t$  时间测不准量,  $M_b C^2$  对应于  $\Delta E$  — 能量测不准量。这初步说明黑洞发射霍金辐射的整个过程就是将能量—物质量子化的过程。

## 《2》:求最小黑洞 $M_{bm} =$ 普朗克粒子 $m_p = (hC/8 G)^{1/2}$ 的信息量 $I_0$ 和熵 $S_{Bbm}$

下面根据普朗克粒子  $m_p$  的数据对 (6c)和 (6d) 式进行验算。在【一】节里, 作者证明了宇宙中的最小黑洞  $M_{bm} = m_p = (hC/8 G)^{1/2} = 1.09 \times 10^{-5} g$ , 其视界半径  $R_{bm} = L_p = (Gh/2 C^3)^{1/2} = 1.61 \times 10^{-33} cm$ , 其  $t_{sbm} = R_{bm}/C = 0.537 \times 10^{-43} s$ 。对普朗克粒子  $m_p$  来说,  $t_{sbm}$  既是其史瓦西时间, 也是其Compton Time。所以, 对最小黑洞的计算是:

$$2t_{sbm} \times M_{bm} C^2 = 2 \times 0.537 \times 10^{-43} s \times 1.09 \times 10^{-5} g \times 9 \times 10^{20} = 1.054 \times 10^{-27} g \cdot cm^2/s. \quad (62a)$$

$$h/2\pi = 6.63 \times 10^{-27} / 2\pi = 1.06 \times 10^{-27} g \cdot cm^2/s. \quad (62b)$$

由上2式的计算结果几乎完全相等, 即,

$$2t_{sbm} \times M_{bm} C^2 = h/2\pi = H \quad (62c)$$

上式说明  $H$  值不多不少 = 宇宙中最小黑洞即普朗克粒子的信息量。可见, 最小黑洞  $M_{bm} =$  普朗克粒子  $m_p$  已经量子化为宇宙中一个最小的信息单位 = 即 1 比特。所以它无法分解为更多和更小的信息量, 因为它的寿命太短了, 已经达到宇宙粒子寿命的最短极限。但是它的能量不是最小, 可以分割。所以  $m_p$  只能分解成高能  $\gamma$  射线和其它低能射线之后, 由于寿命都变得更长, 信息量却能极大地增加。所以  $m_p$  只能在普朗克领域解体消失。如果取采用自然普朗克常数, 可取  $h/2\pi = 1$ 。则  $t_{sbm} \times M_{bm} C^2 = 1$ 。

下面计算  $m_p$  的熵  $S_{Bbm}$ , 按照 (6c)式,

$$S_B (h/2\pi) = \pi 2t_s \times M_b C^2, \quad \text{所以,}$$

$$S_{Bbm} \equiv \pi, \quad \text{而 } I_0 = 2t_{sbm} \times M_{bm} C^2 = h/2\pi \quad (62d)$$

为什么量子化的常数, 普朗克常数, 会不多不少

刚好是我们知道的这个数值? 这个常数的具体数值到底有什么意义。这说明普朗克常数  $I_0 = h/2$  就是宇宙中最小黑洞  $M_{bm} =$  普朗克粒子  $m_p$  的信息量, 这也是宇宙中不可分割的最小信息量。比  $h/2$  更少的信息量在宇宙中不可能存在

方舟的女解释说: ‘这个是什么意思呢? 哲学上说, 存在即是被感知, 感知也就是信息的获得和传递, 一样不携带信息的东西, 是无法被感知的, 所以信息也就是存在。

信息 = 存在 = 能量  $\times$  时间。

普朗克常数 = 能量测不准量  $\times$  时间测不准量

那么为什么存在 = 能量  $\times$  时间呢? 这个反应了存在的两个要素, 存在的东西必须要有能量, 没有能量, 那也就是处于能量基态的真空, 是不存在的。存在的东西也必须要持续存在一定的时间, 如果一样东西只存在零秒钟, 那便是不存在。’<sup>[1]</sup>

她的看法很可能是对的, 可以接受的。

《3》. 任何黑洞  $M_b$  每次发射的任何一个霍金辐射  $m_{ss}$  都只是最小的信息量  $= I_0 = h/2\pi$ , 而与其  $M_b$  和  $m_{ss}$  的数值大小无关。

现在来求任何黑洞的一个霍金辐射粒子  $m_{ss}$  信息量  $I_0$  的普遍式, 根据(1d)式,  $m_{ss} M_b = hC/8 G = 1.187 \times 10^{-10} g^2$ 。所以,

$$I_0 = m_{ss} C^2 \times 2t_c = C^2 hC / (8 GM_b) \times 2R_b / C = C^2 hC / (8 GM_b) \times 2 \times 2GM_b / C^3 = h/2 \quad (63a)$$

上式证明, 任何黑洞的一个霍金辐射粒子  $m_{ss}$  的信息量都是宇宙中最小的、最基本的、不可分割的信息量, 而与  $M_b$  和  $m_{ss}$  的数值大小无关。

(63a)证明任一黑洞的每一个  $m_{ss}$ , 无论大小, 其信息量都是  $I_0$ , 那么, 只要知道黑洞在  $M_b$  时所有的  $m_{ss}$  的数目  $n_i$ , 就可以知道该黑洞的总信息量  $I_m$ , 总熵  $S_{BM}$  了。

$$I_m = n_i I_0, \quad S_{BM} = n_i (I_0) = (I_0) I_m, \quad (63b)$$

$$\text{由于 } M_b = n_i m_{ss}, \quad I_m = I_0 M_b / m_{ss}, \quad (63c)$$

$$\text{再用(1d)式, 从上面 } I_m = I_0 M_b / m_{ss} = 4GM_b^2 / C \quad (63d)$$

$$\text{从(63b)式, } S_{BM} = (I_0) I_m = (I_0) \times 4GM_b^2 / C = 2\pi^2 R_b^2 C^3 / hG = S_B, \quad (63e)$$

(63e)与上面的(6a)式完全相同, 这证明本文中所有公式的推导和计算完全是正确而圆满自洽的。

结论: A. 由(63d)可知, 当黑洞  $M_b$  由于吞噬外界质能量或者与其它黑洞合并而增加其质能量时, 因  $I_m$  正比例于  $M_b^2$ , 所以信息量是增加的。而当发射霍金辐射  $m_{ss}$  而缩小时, 由于该黑洞的总  $m_{ss}$  数  $n_i$  是确定的, 而每个信息量  $I_0$  又相等, 因此, 在发射霍金辐射  $m_{ss}$  的过程中, 总信息量是守恒的。B. 在宇宙中, 黑洞在吞噬外界能量—物质时, 是最贪婪的饥饿鬼, 来者不拒, 多多益善。当它的外界空空如也, 而向外界发射霍金辐射时, 它是最小气的吝啬鬼, 每次只向外吐出一份最小的信息, 黑洞愈大, 愈吝啬。按照我

的计算,如果我们现在的宇宙黑洞外界也是空空如也的话,它 $10^{12}$ 年才向外发射一个最微小的霍金辐射粒子  $m_{ss} = 10^{-66}g$ 。C。从(4j)式  $m_{ss}C^2 = (h/2\pi) \times C/\lambda_{ss}$  中可得出,任何霍金辐射  $m_{ss}$  的波长  $\lambda_{ss}$  等于黑洞  $M_b$  的直径。

$$\lambda_{ss} = 2 t_c C = 2R_b = D_b \tag{63f}$$

**【七】. 人类也许永远不可能制造出任何真正的人造引力(史瓦西)黑洞**

其实,道理很简单,最小黑洞  $M_{bm} = 1.09 \times 10^{-5}g$ , 其  $R_{bm} = 1.61 \times 10^{-33}cm$ , 其康普顿时间 Compton time  $t_c =$  史瓦西时间  $t = 0.537 \times 10^{-43}s$ , 相当于其寿命

$\tau_{bm}$ 。但是,一个质子的质量  $p_m = 1.66 \times 10^{-24}g$ 。由于不可能存在小于  $M_{bm} = 1.09 \times 10^{-5}g$  的极小黑洞,所以只能企图制造出最小黑洞  $M_{bm}$ ,这就必须要把  $10^{20}$  个质子  $p_m$  在极其准确的瞬时在对撞机上对撞,这做得得到吗?更困难的是,相邻质子之间的最短距离是  $10^{-13}cm$ , 2个质子以光速的速度,需要  $10^{-24}$  秒的时间才能碰在一起,而最小黑洞  $M_{bm}$  的寿命才只有  $10^{-43}$  秒。相差都是  $10^{20}$  数量级啊。就是说,最小黑洞  $M_{bm}$  即便制造出来了,也不可能存在和长大。因此,一些科学家叫嚣制作出人造黑洞,或者黑洞炸弹,都是骗人和骗钱的鬼话。

**第二篇 对宇宙学的一些新观点和新探讨**

**==黑洞理论否定了宇宙起源于‘奇点’的谬论==**

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本文的新观点是完全建立在上面对黑洞的新旧理论的基层之上的。

**【1】到【5】---用黑洞的新观念证明我们宇宙诞生于在普朗克领域 Planck Era 新生成的大量原初最小黑洞  $M_{bm}$ , 即普朗克粒子  $m_p$  的合并,而且  $M_{bm} = m_p = (hC/8 G)^{1/2} = 1.09 \times 10^{-5}g$ ; 而不是诞生于“奇点”或“奇点的大爆炸”。【6】--证明我们现在宇宙是一个质量为  $10^{56}g$  的真正的巨无霸宇宙黑洞 (CBH)。【7】--宇宙原初暴涨 (Original Inflation) 的新机理和新证明。【8】. 从宇宙 7 种大小的黑洞  $M_b$  分析黑洞宇宙的演变**

**【1】. 我们宇宙的演化规律与公式:**根据近代宇宙天文学和物理学的最新成就,对我们宇宙的演化规律,即其参数  $t, R, T$  之间的数值关系可以用公式准确的表示出来。 $t$ —宇宙的特征膨胀时间,  $R$ —宇宙的特征尺度或大小,  $T$ —宇宙辐射温度,  $k_1, k_2, k_3$ —常数。当宇宙从我们所知道和假定的诞生时刻 Planck Era,  $t = \pm 10^{-43}$  秒到宇宙膨胀到辐射时代 Radiation Era,  $t = 1/3 \times 10^6$  年结束,其膨胀的规律公式如下,

$$Tt^{1/2} = k_1, R = k_2 t^{1/2}, RT = k_3 \tag{1a}$$

宇宙在物质占统治地位时代 Matter-dominated Era,  $t = 1/3 \times 10^6$  年到现今的膨胀的规律公式如下,  $k_6, k_7, k_8$  为常数,

$$Tt^{2/3} = k_6, R = k_7 t^{2/3}, RT = k_8 \tag{1b}$$

**【2】. 根据什么原理来确定我们宇宙准确的诞生时刻  $t_m$ ?**既然我们宇宙按照上面的公式膨胀,我们就可以按公式往回推,以便找到宇宙较准确的、有根据的诞生时刻  $t_m$ 。上面所提到的,下面将论证  $t = 10^{-43}$  秒是不是要找到的  $t_m$ ?

由  $R = k_2 t^{1/2}$  式可知,当  $t$  往后缩小 4 倍时,  $R$  才缩小 2 倍。这样,当  $t$  一直小下去时,就会达到一个极限,  $R = Ct$ , 既造成相邻粒子之间无足够时间传递彼此的引力,也造成任何粒子的中心引力无法传递到其边界,而形成宇宙内所有粒子内外的引力断链,变成能量的碎末。在此时刻  $t_m$ , 宇宙就无法继续收

缩成为‘奇点’了。如果是这样,我们宇宙就不可能诞生于‘奇点’,而是诞生于那些无引力的能量的碎末,又重新集结成为新粒子而恢复引力的那一时刻  $t_m$  了。那新集结成的粒子和  $t_m$  又是什么呢?

**【3】. 求宇宙诞生时,恢复引力链的那一时刻  $t_m$ , 和重新结合的新粒子,**

设  $d_m$ —两相邻粒子间的实际距离,  $m$ —宇宙退缩到最后引力断链时的粒子质量,  $r$ —粒子  $m$  的半径,  $t$ —宇宙粒子的引力从中心传递到其视界半径的特征时间,即史瓦西时间,  $C$ —光速,  $\rho$ —粒子  $m$  的能量-物质密度,  $H$ —哈勃常数,

$$d_m = C \times 2t, \text{ 即 } d_m/2C = t, \tag{3}$$

$$\rho = \text{能量密度 } g/cm^3, m = 4\pi R^3/3, \tag{3aa}$$

$H =$  哈勃常数,宇宙在同一时间的常数,  $H = V/R = 1/t$ ,

$$\text{已知 } 4 r^3/3 = m, m = T/C^2, \therefore t^3 = 3 T/4 C^5 \tag{3a}$$

$$\text{由 } \rho = 3H^2/8 G = 3/(8 Gt^2), \tag{3ba}$$

$$\therefore t = T(2G)/(C^5), \tag{3b}$$

$$\text{从(1a), } Tt^{1/2} = k_1 \tag{3ca}$$

$$\therefore t^{3/2} = k_1 (2G)/C^5 \text{ 或者 } t = [k_1 (2G)/C^5]^{2/3} \tag{3c}$$

公式 (3a),(3b),(3c)都是从公式 (3) 推导出来的,所以三式中的  $t$  是等值的。

我们宇宙

现求  $t$  值如下：先从上面第一篇【一】中选取普朗克粒子相对应的参数作为  $t$ ,  $T$  值代入(1a)求  $k_1$ 。当取  $t = 10^{-43}$  s, 其温度  $T = 10^{32}$  K, 如是,

$$k_1 = Tt^{1/2} = 10^{32} \times 10^{-43} s = 3^{1/2} \times 10^{10} \cdot 1.732 \times 10^{10},$$

从公式 (3c),

$$t^{3/2} [(2G)/(C^5)] \times k_1 = 1.732 \times 10^{10} [(2G)/(C^5)], \quad (3cb)$$

$$G = 6.67 \times 10^{-8} \text{ cm}^3/\text{g s}^2, \quad C = 3 \times 10^{10} \text{ cm/s}, \quad = 1.38 \times 10^{-16} \text{ g cm/s}^2 \text{ K},$$

$$t^{3/2} [(2 \times 6.67 \times 10^{-8} \times 1.38 \times 10^{-16}) / (3 \times 10^{10})^5] \times 1.732 \times 10^{10} = 0.075758 \times 10^{-74} \times 1.732 \times 10^{10} \cdot 0.1312 \times 10^{-64},$$

$t^3 = 0.017217 \times 10^{-128} = 0.17217 \times 10^{-129}$ , 为计算方便, 下面令  $t = t_m$ ,

$$t_m = 0.5563 \times 10^{-43} \text{ s}, \quad (3d)$$

$$\therefore t_m = 0.5563 \times 10^{-43} \text{ s}, \quad (3d)$$

可见,  $t$  与  $t_m$  即是粒子与整个宇宙中相邻粒子之间引力断链的时间。相对应地:

$$T_m = k_1/t^{1/2} = 1.732 \times 10^{10} / (0.5563 \times 10^{-43})^{1/2} = 0.734 \times 10^{32} \text{ K}, \quad (3e)$$

$m_m$  与  $0.734 \times 10^{32}$  K 其相对应粒子质量:

$$m_m = T/C^2 = 1.38 \times 10^{-16} \times 0.734 \times 10^{32} / (9 \times 10^{20}) = 1.125 \times 10^{-5} \text{ g}, \quad (3f)$$

$$= 3/(8 Gt^2) = 0.5786 \times 10^{93} \text{ g/cm}^3, \quad (3g)$$

从公式 (3aa),  $m_m$  的半径  $r_m$ ,

$$r_m = (3m/4 \rho)^{1/3} = 1.67 \times 10^{-33} \text{ cm}, \quad (3h)$$

$$d_m = C \times 2t = 3.34 \times 10^{-33} \text{ cm},$$

$$d_m = 2 r_m (= 3.34 \times 10^{-33} \text{ cm}) \quad (3i)$$

$$\therefore (d_m = 2 r_m) \quad (3j)$$

(3j) 表明我们宇宙退缩到  $m_m$  时, 2 邻近粒子之间的引力却是断链了。断链前由粒子  $m_m$  组成“宇宙包”里的密度  $\rho_u$ ,

$$\rho_u = m_m/d_m^3 = 0.302 \times 10^{93} \text{ g/cm}^3 \quad (3k)$$

【4】我们宇宙出生时, 恢复引力断链的新粒子  $m_m$ , 它们就是构成我们现在宇宙的基本单元, 它们其实就是第一篇中的最小黑洞  $M_{bm} = (hc/8 G)^{1/2} =$  普朗克粒子  $m_p = 1.09 \times 10^{-5} \text{ g}$ 。将上节的计算与  $M_{bm}$  和  $m_p$  的比较结果列在下面的表一中,

表一:  $M_{bm}$ ,  $m_p$  和  $m_m$  的各种参数的比较

$m_m$ 无引力状态	$M_{bm}$ -最小黑洞	$m_p$ -普朗克粒子
$m_m = 1.125 \times 10^{-5} \text{ g}$	$M_{bm} = 1.09 \times 10^{-5} \text{ g}$	$m_p = 1.09 \times 10^{-5} \text{ g}$
$t_m = 0.5563 \times 10^{-43} \text{ s}$	$t_{bm} = 0.539 \times 10^{-43} \text{ s}$	$t_p = 0.539 \times 10^{-43} \text{ s}$
$T_m = 0.734 \times 10^{32} \text{ k}$	$T_{bm} = 0.71 \times 10^{32} \text{ k}$	$T_p = 0.71 \times 10^{32} \text{ k}$
$r_m = d_m/2 = 1.67 \times 10^{-33} \text{ cm}$	$R_{bm} = 1.61 \times 10^{-33} \text{ cm}$	$L_p = 1.61 \times 10^{-33} \text{ cm}$

由表一中的数据可知, 恢复引力的新粒子  $m_m$  就是最小黑洞  $M_{bm} =$  普朗克粒子  $m_p$ 。其原材料来源于普朗克领域中的零散的、碎小的能量粒子, 是它们结合成了新  $M_{bm} = m_p$ 。表一中  $m_m$  之所以不完全等于  $M_{bm} = m_p$ , 只是计算时求  $k_1$ ,  $m_m$ ,  $t_m$ ,  $T_m$  等的误差所引起。只是计算时求  $k_1$ ,  $m_m$ ,  $t_m$ ,  $T_m$  等的误差所引起。

【5】在前辈消失在普朗克领域之后, 我们的新宇宙是如何从普朗克领域诞生出来的?

如果我们现在宇宙的所有能量-物质都来自前辈宇宙, 按照时间对称原理, 很显然, 假设一个前辈宇宙有一次大塌缩, 其最后的塌缩规律与我们宇宙诞生时的膨胀规律近似, 其最后塌缩的结果只会同时产生 3 种状态, 如上面的表一所示, 即相邻粒子  $m_m$  之间的引力断链、最小黑洞  $M_{bm}$  和普朗克粒子  $m_p$ , 即  $m_m = M_{bm} = m_p$ 。在上一篇已经论证了  $M_{bm} = m_p$  只能爆炸解体消亡在普朗克领域。这种爆炸就是产生我们宇宙的所谓的‘大爆炸’。它就是许多人喜欢将我们宇宙的诞生说成的那次“大爆炸”。

前辈宇宙塌缩成为  $M_{bm} = m_p$  在普朗克领域的‘大爆炸’的 3 种结果为我们宇宙的诞生提供了充分和必要的条件: 1\*。‘大爆炸’使前辈宇宙发生‘相变’, 即从‘塌缩相’转变为‘膨胀相’, 从而阻止前辈宇宙继续塌缩成为‘奇点’。 2\*。‘大爆炸’

使宇宙密度和温度的少许降低使宇宙中能够产生比  $M_{bm}$  稍大、寿命比其康普顿时间稍长的‘新小黑洞’, 它们才是我们新生宇宙的、能够成长的细胞。 3\*。‘大爆炸’  $M_{bm} = m_p$  解体后后的能量物质碎末, 为转变组成为宇宙的‘新细胞’(新的最小黑洞)提供了能量物质基础, 它们的出现这就是我们新宇宙的诞生。

我们新宇宙是如何从旧宇宙的废墟中诞生的呢? 关键问题在于从旧宇宙解体的废旧能量-物质, 能够重新集成为新的稍长寿命的最小引力(史瓦西)黑洞--  $2M_{bm}$ 。其实, 在  $10^{32} \text{ k}$  和密度  $10^{93} \text{ g/cm}^3$  如此高的普朗克领域本来就是能量与粒子随时都在湮灭和产生而互相转换的。我们知道它们湮灭和产生的时间就是康普顿时间, 即 Compton Time. = 史瓦西时间。因此, 只有当新生粒子的寿命  $\tau_b$  大于康普顿时间  $t_{bc}$  时, 该粒子才能存活下来, 生长下去, 而成为稳定的小黑洞。上篇中已经论证过, 黑洞一旦形成, 除最后变为普朗克粒子  $m_p$  而爆炸消失外, 它将永远是一个黑洞。按照霍金的黑洞寿命公式, 黑洞寿命  $\tau_b$ ,

$$\tau_b = 10^{-27} M_b^3 \text{ (s)} \quad (5a)$$

$$t_{bc} = R_b/C \quad (5b)$$

因此, 只有在  $\tau_b > t_{bc}$  时, 即  $10^{-27} M_b^3 > R_b/C$  时, 新产生的新黑洞  $M_b$  才能存活, 并吞噬外界能量-物质而不断地长大, 从上面公式, 可得出,

$$M_b = M_{bmn} = 2.2 \times 10^{-5} \text{g} (\approx 2 M_{bm}) \quad (5c)$$

在当时‘宇宙包’里如此高密度  $\approx 10^{93} \text{g/cm}^3$  下，密度和温度的少许降低，是很容易形成稍大的  $M_{bmn} \approx 2M_{bm}$  的新最小黑洞的。一旦  $M_{bmn}$  形成之后，它们就会吸收外界极高密度的能量-物质和互相合并而不停地长大。 $M_{bmn}$  就成为我们新生的宇宙的胚胎，他们的合并和互相连接在一起，造成了宇宙的“原初暴涨”。这就是我们宇宙诞生的机理和过程。“原初暴涨”后，形成较大的‘原初小黑洞’。它们继续合并造成的膨胀就形成了我们现在有 137 亿年的膨胀的宇宙。

**结论：**我们宇宙诞生的 2 个 必要条件和过程 是：1. 前辈宇宙及其旧的最小黑洞  $M_{bm} = m_p = 1.09 \times 10^{-5} \text{g}$  的消亡为我们宇宙提供了能量-物质基础。2. 前辈宇宙及其旧的最小黑洞  $M_{bm} = m_p$  的爆炸使“宇宙包”里的温度降低，而能够产生较大的较长寿命的稳定的新最小黑洞  $M_{bmn}$  成为产生新宇宙的胚胎。没有  $M_{bmn} = 2.2 \times 10^{-5} \text{g}$  作为胚胎，就不可能有我们现在的巨无霸宇宙，因只有黑洞才能吞噬外界的能量-物质而长大，并能不让它们流失出去。

**【6】. 完全论证我们现在宇宙是一个质量为  $10^{56} \text{g}$  的真正的巨无霸宇宙黑洞 (cosmic-BH, CBH)。我们宇宙的膨胀就是大量的最小黑洞  $M_{bm} \sim M_{bmn}$  在宇宙初期合并和以后不断合并产生膨胀的结果。Hubble 定律就是我们宇宙小黑洞不断合并，即吞噬外界能量-物质而膨胀的规律。宇宙的平直性 ( $= r / \rho = 1$ ) 是宇宙黑洞的本性。**

**【1】.** 现代精密的各种天文望远镜实际的观测数据表明，我们宇宙球体具有精密而可靠的数据。

(A). 我们宇宙真实可靠的年龄  $A_u = 137$  亿年<sup>[8]</sup> 于是，由此计算出，其视界半径  $R_u = C \times A_u = 1.3 \times 10^{28} \text{cm}$ ，密度  $\rho_u = 3/(8 G A_u^2) = 0.958 \times 10^{-29} \text{g/cm}^3$ 。所以，宇宙的总质量  $M_u = 8.8 \times 10^{55} \text{g}$ 。

(B). Hubble 常数的实际的可靠的观测数值是  $H_0 = (0.73 \pm 0.05) \times 100 \text{kms}^{-1} \text{Mpc}^{-1}$ <sup>[9]</sup>，由此算出宇宙的实际密度  $\rho_r = 3H_0^2/(8 G) = 10^{-29} \text{g/cm}^3$ 。并得出宇宙年龄  $A_r^2 = 3/(8 G \rho_r)$ ， $\therefore A_r = 0.423 \times 10^{18} \text{s} = (134 \pm 6.7)$  亿年。结果，宇宙的总质量可大致确定为  $M_r = 8.6 \times 10^{55} \text{g}$ 。

由此可见 两种不同的精确测量数据所得出的结果几乎完全一致。因此，取我们宇宙的数据如下作为后面的计算。取宇宙总质量  $M_u = 8.8 \times 10^{55} \text{g}$ 。则宇宙年龄  $A_u = 137$  亿年。视界半径  $R_u = 1.3 \times 10^{28} \text{cm}$ ，宇宙密度  $\rho_u = 0.958 \times 10^{-29} \text{g/cm}^3$ 。

**【2】.** 假如我们现在宇宙是一个真实的巨无霸宇宙黑洞 (CBH)，按照质能不灭原理，它就必然来自大量宇宙最小黑洞  $M_{bmn} \approx 2 M_{bm}$  的合并。为计算方便，现仍取最小黑洞  $M_{bm} = m_p = 1.09 \times 10^{-5} \text{g}$ ，其  $R_{bm} = 1.61 \times 10^{-33} \text{cm}$ ，其  $T_{bm} = 0.71 \times 10^{32} \text{k}$ ，其霍金辐射量子  $m_{ss} = 1.09 \times 10^{-5} \text{g}$ 。令  $N_{bu}$  是  $M_u$  拥有  $M_{bm}$  的数目。当

然如果取  $M_{bmn} \approx 2 M_{bm}$  作为计算，结果与取  $M_{bm}$  是一样的。因为  $M_{bmn} \approx 2 M_{bm}$ 。

$$N_{bu} = M_u / M_{bm} = 8.8 \times 10^{55} / 1.09 \times 10^{-5} = 8.0734 \times 10^{60} \quad (6a)$$

假如我们宇宙是一个由  $N_{bu}$  个  $M_{bm}$  合并而成的宇宙黑洞，那么，宇宙的  $R_u$  也应该准确地是  $R_{bm}$  的  $N_{bu} = 8 \times 10^{60}$  倍。计算结果如下：

$$N_{bu} = R_u / R_{bm} = 1.3 \times 10^{28} / 1.61 \times 10^{-33} = 8.075 \times 10^{60} \quad (6b)$$

(6a) = (6b)，清楚地证明，我们宇宙  $M_u$  确实是由  $N_{bu}$  个最小黑洞  $M_{bm}$ ，合并膨胀而成的宇宙黑洞。

**【3】. 宇宙膨胀的 Hubble 定律就是宇宙黑洞吞噬外界能量-物质和小黑洞合并而膨胀的规律。**

将 Hubble 定律运用到我们宇宙球体的视界， $M_u = 4\pi\rho_u R_u^3 / 3 = 4\pi(3H_0^2 / 8\pi G) C^3 t_u^3 / 3 = 4\pi(3H_0^2 / 8\pi G) C^3 t_u / 3H_0^2 = C^3 t_u / 2 G = \underline{C^2 R_u / 2 G}$  (6c)

从史瓦西公式， $2G M_b = C^2 R_b$

$$M_b = R_b C^2 / 2 G = C^3 t_{bu} / 2 G = \underline{R_{bu} C^2 / 2 G} \quad (6d)$$

现在由于  $t_u = t_{bu}$ ， $R_{bu} = R_u$ ， $M_u = M_b$ ，(6c) = (6d)。而证实我们宇宙是一个真正的宇宙黑洞，黑洞只有在吞噬外界能量-物质或者与其它黑洞合并才产生膨胀。因此 Hubble 定律所反应的宇宙质量随时间的增长而正比例增长的规律，正是黑洞吞噬外界能量-物质的膨胀规律。什么时候  $t_u = t_{bu}$ ？一旦黑洞吞噬完外界能量-物质，黑洞就会停止膨胀，此时  $t_{bu}$  就几乎不变，Hubble 定律也就失效了。宇宙年龄  $t_u$  黑洞的 Compton 时间  $t_{bu}$ 。

**【4】. 关于我们宇宙的“平直性”问题，即 ( $= r / \rho = 1$ ) 问题。黑洞的平均密度  $\rho$  在确定的质量  $M_b$  下只有一个确定值。我们宇宙作为一个真正的宇宙黑洞就是一个密封的巨大球体，所以 ( $= r / \rho = 1$ ) 是黑洞的本性，是必然的结果，不能例外。因此，50 年来，科学家们根据广义相对论的错误结论，对 ( $= r / \rho = 1$ ) 的争论是一个毫无意义的伪命题。**

由于广义相对论提出了错误的命题 ( $= r / \rho = 1$ )，已经导致许多科学家提出某些错误的观念，比如最明显地是“寻找宇宙丢失的能量-物质”，其次“零点能”与“暗能量”等也与此有关。因此，从公式 (6a) 和 (6b) 来看，我们宇宙黑洞 CBH 一点能量-物质也未丢失，一点也不少，当然也不多。

从现在起，如果宇宙黑洞外面没有能量-物质，宇宙黑洞就会开始发生霍金辐射而不停地收缩，直到最后收缩成为最小黑洞-- $M_{bm}$  而爆炸消失，宇宙的年龄就是约为  $\tau_b = 10^{-27} M_b (\text{s}) = 10^{-27} (8.8 \times 10^{55})^3 10^{132} \text{年}$ 。如果外面还有能量-物质，宇宙黑洞会继续吞噬外界能量-物质而扩大，只有在吞噬完所有外界能量-物质后，才会不停地发射黑洞霍金辐射而最后收缩成为  $M_{bm}$  爆炸消失。其年龄按 (5a) 式计算  $\gg 10^{132}$  年。

**【7】. 作者用宇宙诞生于“最小黑洞  $M_{bm}$  的合并”**

原理,对宇宙“原初暴涨”的机理、过程和终结提出了最新最简单的解释和计算。认为宇宙“原初暴涨”终结的时间  $t_0$  就是宇宙  $M_u$  内所有‘原生最小黑洞’  $M_{bm}$  连成一体,而造成宇宙黑洞‘空间暴涨’的宇宙时间。

从上节可知,我们现在黑洞宇宙的总质量是  $M_u = 8.8 \times 10^{55} \text{g}$ , 它来自宇宙诞生时  $N_{bu} = 8 \times 10^{60}$  个最小黑洞  $M_{bm}$   $m_p = 1.09 \times 10^{-5}$  的合并。因此,我们宇宙黑洞的 137 亿年的膨胀就是那诸多最小黑洞合并所产生的膨胀。如果将从宇宙诞生到将原始“宇宙包”内所有组成  $M_u$  的最小黑洞  $N_{bu} \times M_{bm}$  连成一整体的时间定为  $t_{0e}$  由于那时  $M_{bm}$  的视界半径  $R_{bm} = 1.61 \times 10^{-33} \text{cm}$ 。

1\*. 假设  $M_{bm}$  在诞生后需要 2 或者 3 倍的  $t_{bmc}$  时间将其邻近的  $N_m$  个  $M_{bm}$  连接起来,  $t_{bmc}$  就是  $M_{bm}$  的 Compton 和史瓦西时间,  $t_{bmc} = R_{bm}/C = 1.61 \times 10^{-33}/3 \times 10^{10} = 5.37 \times 10^{-44} \text{s}$ 。当光(引力)走  $2 \times t_{bmc}$  时,  $M_{bm}$  所能够连接的其它的  $M_{bm}$  的数目为  $N_{m2}$ ,

$$N_{m2} R_{bm}^3 = (2R_{bm})^3, \quad \therefore N_{m2} = 8 \quad (7a)$$

(7a) 式表明,当  $M_{bm}$  的引力传递时间从  $t_{bmc}$  延长到  $2 t_{bmc}$  时,  $M_{bm}$  能够连接 8 个  $M_{bm}$ 。那么,  $M_{bm}$  需要延长多少倍时间才能将所有  $M_u$  中的  $N_{bu} = 8.075 \times 10^{60}$  个  $M_{bm}$  连成一体呢?

$$N_{bu} = 8.8 \times 10^{60} 10^{61} = (8^{67.5}) \quad (7b)$$

(7b) 式表明,在  $M_{bm}$  的引力走过 ( $2^{67.5}$ ) 倍的  $t_{bmc}$  后,所有的  $N_{bu} (= 8^{67.5} 10^{61}) \times M_{bm}$  就连成一体成为宇宙 ( $M_u$ ) 的原初“宇宙包”了。

$$(2^{67.5}) (10^{20.3}), \quad \text{令 } n_{o2} = 10^{20.3} \quad (7c)$$

现在以同样的方式求  $N_{m3}$ ,

$$N_{m3} R_{bm}^3 = (3R_{bm})^3, \quad \therefore N_{m3} = 27 \quad (7d)$$

$N_{bu} = 8.8 \times 10^{60} 10^{61} = (27^{42.6})$ , 而 ( $3^{42.6}$ ) ( $10^{20.3}$ ), 令  $n_{o3} = 10^{20.3}$ ,

$$\therefore n_o = n_{o2} = n_{o3} (10^{20.3}) \quad (7e)$$

由(7c)和(7e)可知,不管  $t_{bmc}$  以几倍的时间延长,连接整个  $M_u$  所需的时间是一样的,即  $10^{20.3}$  秒。但从(7a)和(7d)看,由于黑洞的合并必然会产生“空间膨胀”,这种‘空间膨胀’就是宇宙的“原初暴涨”,从(7a)看,当  $M_{bm}$  连接其它的 8 个  $M_{bm}$  时,其  $R_{bm}$  也会增长 8 倍,即  $8 = 2^3$  倍。同样在(7d),  $R_{bm}$  也会增长  $27 = 3^3$ 。这就是说,  $t_{bmc}$  延长到  $2 t_{bmc}$  时,其所连接的  $M_{bm}$  数就不是  $2^3$ , 而是  $(2^3)^3 = 2^9$ 。同样,当时间  $t_{bmc}$  延长到  $3 t_{bmc}$ , 其所连接的  $M_{bm}$  的数目应是  $3^9$ 。

下面用同样的方式求一般规律的  $n_o$ ,

$$\text{令 } N_{mn} = n_o^9, \quad \text{和 } n_o = 10^x \quad (7f)$$

$$\text{但 } N_{bu} = 10^{61}, \quad \therefore 10^{61} = 10^{9x} \quad (7g)$$

$$x_1 = 61/9 = 6.8, \quad \therefore n_{o1} = (10^{6.8}) \quad (7-1a)$$

(7-1a) 是“暴涨”情况下  $t_{bmc}$  延长的倍数  $n_{o1}$ 。现在按照从(7e)式的原理,得出一个在没有“暴涨”情况下的  $x_2$  和  $n_{o2}$ , 可称为“超速膨胀”。

$$x_2 = 61/3 = 20.3 \quad n_{o2} = 10^{20.3} \quad (7-1b)$$

$$\therefore n_{o2} = n_{o1}^3 \quad \text{或者 } n_{o2} = 10^{13} n_{o1} \quad (7-1c)$$

2\*. 公式(7-1a)和(7-1b)证明了将所有  $M_{bm}$  连成一体而组成整个“宇宙包”的有 2 种方式; 不管以何种方式, 将所有  $M_{bm}$  连成一体为  $M_u$  所需的时间都是由  $M_u$  的值所确定的。

A. 原初暴涨:  $t_{o1} = t_{bmc} \times n_{o1} = 5.37 \times 10^{-44} \times 10^{6.8} = 0.2 \times 10^{-36} \text{s} = 2 \times 10^{-37} \text{s}$ 。 (7-2a)

B. 超速膨胀:  $t_{o2} = t_{bmc} \times n_{o2} = 5.37 \times 10^{-44} \times 10^{20.3} = 2 \times 10^{-24} \text{s}$  (7-2b)

$$t_{o2}/t_{o1} = n_{o2}/n_{o1} = 2 \times 10^{-24}/2 \times 10^{-37} = 10^{13} \quad (7-2c)$$

3\*. 从(7-1a)和(7-1b)到(7-2a)和(7-2b), 似乎可以推测出有 2 种‘暴涨’的方式。[A]。第一种是“原初暴涨”, 即符合(7-1a)和(7-2a)的规律, 其膨胀的时间从宇宙出生时的  $5.37 \times 10^{-44} \text{s}$  到  $t_{o1} = 10^{-36.5} \text{s}$ , 但其膨胀的结果仍然达到了与 ( $t_{o2} = 10^{-23} \text{s}$ ) 时的‘大膨胀’的结果向一致, 2 种不同时间  $t_{o1} = 10^{-36.5} \text{s}$  和  $t_{o2} = 10^{-23} \text{s}$  都达到了向等(一致)的视界半径  $R_b$ 。只是其终结的时间不同而已。因此, 其在时间段从  $t_{o1} = 10^{-36.5} \text{s}$  到  $t_{o2} = 10^{-23} \text{s}$ , 宇宙黑洞似乎在喘一口气, 停止了膨胀。 [B]。

第二种是‘超速膨胀’, 它符合(7-1b)和(7-2b)的规律, 其时间是从  $5.37 \times 10^{-44} \text{s}$  连续到  $t_{o2} = 10^{-23} \text{s}$ , 其膨胀结束时的  $R_b$  与 A 种是相同的。但二者结束暴涨的时间点是不相同的。A 是  $t_{o1} = 10^{-36.5} \text{s}$ , B 是  $t_{o2} = 10^{-23} \text{s}$ 。 [C]。从  $t_{o2} = 10^{-23} \text{s}$  直到现在, 我们宇宙黑洞的膨胀是合乎哈勃定律的正常膨胀, 是由宇宙中小黑洞不断地合并长大所产生的。

结论: 宇宙暴涨的结束时间  $t_{o1} = 10^{-36.5} \text{s}$  和  $t_{o2} = 10^{-23} \text{s}$  是与 NASA/WMAP 所观察到的‘暴涨时间’大致相同的。

4\*. 现在举例来探讨有“原初暴涨”的情况: 按照苏宜《新天文学概论》中 12.7 节中的资料和计算, [3] 他根据的是公式 (1a)  $R = k_1 t^{1/2}$ ,  $R$  为  $t$  时的宇宙尺寸,  $t$  为从宇宙创生起的宇宙年龄, 在  $t = 10^{-36} \text{s}$  时, 宇宙经过“暴涨”的尺寸为  $R_{36} = 3.8 \text{cm}$ , 此时, 求出宇宙密度  $\rho_{bbb} = 3.8 \times 10^{53} \text{g/cm}^3$ , 宇宙在  $M_{bm}$  时的尺寸, 即  $t = 5.37 \times 10^{-44}$  时的尺寸  $R_{44}$ 。

$$R_{36} = 1.83 \times 10^{25} \text{cm} \times (10^{-36} \text{s})^{1/2} / (7 \times 10^5 \times 3.156 \times 10^7 \text{s})^{1/2} = 3.8 \text{cm} \quad (7-4a)$$

$$\text{由于 } M_u = 10^{56} \text{g}, \text{ at } R_{36} = 3.8 \text{cm}, \text{ 密度 } \rho_{36},$$

$$\rho_{36} = 3M_u / (4\pi R_{36}^3) = 4.4 \times 10^{53} \text{g/cm}^3 \quad (7-4b)$$

$$\text{然而 } R_{44} \text{ of } M_{bm} = (3M_u / 4\pi \rho_u)^{1/3} = 10^{-13} \text{cm} \quad (7-4c)$$

$$R_{36}/R_{44} = 3.8/10^{-13} = 3.8 \times 10^{13} \quad (7-4d)$$

苏宜教授在他的书中说: ‘原初暴涨’从  $R_{44} = 10^{-13} \text{cm}$  到  $R_{36} = 3.8 \text{cm}$  的结果, 即从  $t = 5.37 \times$

$10^{-44}$ s 到  $t = 10^{-36}$ s,  $R_{36}/R_{44} = 3.8 \times 10^{13}$ , 体积的增长达到了约  $10^4$  倍, 这资料和计算结论是很典型的例子。

5\*. 下面将作者前面计算结果与苏宜教授的上述结果做一对比,

令  $M_{23}$  和  $R_{23}$  是我们宇宙黑洞在 ‘原初暴涨’  $t_{o2} = 10^{-23}$ s 结束时的 ‘宇宙小黑洞’ 的质量和其视界半径,

$$R_{23} = C t_{o2} = 3 \times 10^{10} \times 10^{-23} \text{s} = 3 \times 10^{-13} \text{cm} \quad (7-5a)$$

$$M_{23} = 0.675 \times 10^{28} R_{23} = 2 \times 10^{15} \text{g} \quad (7-5b)$$

令  $R_{b-23}$  是宇宙黑洞( $M_b$ ) 在  $t_{o2} = 10^{-23}$ s 时的视界半径, 则,  $M_b/M_{b-23} = R_{b-23}^3/R_{23}^3$ ,

$$R_{b-23}^3 = 10^{56}/(2 \times 10^{15}) \times (3 \times 10^{-13})^3, \text{ 所以,} \quad (7-5c)$$

—  $R_{b-23} = 11 \text{cm}$   
由于苏宜教授的数据是在  $10^{-36}$ s, 其  $R_{36} = 3.8 \text{cm}$ , 而作者的数据是在  $t_{o1} = 10^{-36.5}$ s 时的  $R_{b-23} = 11 \text{cm}$ , 因此 只有将 2 二者转变期同一 3.8cm 下考察期时间的不同。

$$R_{b-23} = 3.8 \text{cm? 因为,} \\ t_{o1-36}/t_{o1} = (R_{36} = 3.8)/(R_{36.5} = 11), \text{ so,} \\ t_{o1-36} = 10^{-37} \text{s} \quad (7-5d)$$

结论: [A]. 从 (7-5d)可知, 按照作者新原初暴涨的机理, 计算出我们宇宙暴涨到  $R_b = 3.8 \text{cm}$  的时间应该是在  $t_{o1-36} = 10^{-37}$ s 而不是苏宜教授的在  $t_{o1} = 10^{-36.5}$ s。 [B]. 作者清楚地计算出来了结束 ‘原初暴涨’ 的时刻是在  $t_{o1} = 10^{-36.5}$ s, 当时宇宙的视界半径是  $R_{b-23} = 11 \text{cm}$ . [C]. 如果苏宜教授的数据资料和计算结果是对的话, 就表明宇宙的 ‘原初暴涨’ 符合 3\* 节中的 A 种。

**【8】. 从宇宙 7 种大小不同的黑洞  $M_b$  分析宇宙黑洞的演变**

从前面可知, 一旦在新的最小黑洞  $M_{bm}$  在普朗克领域生成之后, 它们在极高密度为  $10^{92} \text{g/cm}^3$  的宇宙包裹里是互相紧贴着的。它们最初的合并造成了宇宙的原初暴涨。它们只有合并和吞噬外界的能量-物质才能降低内部的压力和温度。暴涨后, 最小黑洞成长为  $2 \times 10^{15} \text{g}$  的微型黑洞, 见(7-5b)式。但是, 这许多的微型黑洞仍然是在高密度约  $10^{53} \text{g/cm}^3$  下紧贴在一起, 他们的继续合并造成宇宙的继续膨胀, 即从下面表二中从#1 最小黑洞经过  $\Rightarrow \#2 \Rightarrow \#3 \Rightarrow \#4 \Rightarrow \#5 \Rightarrow \#6 \Rightarrow \#7$  我们宇宙大黑洞。如果我们宇宙外现在仍然有能量-物质可被吞噬, 宇宙还会继续膨胀, 直到吞噬完外面所有的能量-物质为止。之后才会发射霍金辐射而不停地收缩, 再从#7 黑洞返回直到  $\Rightarrow \#1$  最小黑洞, 而爆炸消亡在普朗克领域。这就是我们宇宙黑洞的生死循环, 它符合宇宙中任何事物都有生死的普遍规律。

表二中的  $M_b$ 、 $R_b$ 、 $T_b$ 、 $t_b$  (黑洞寿命)  $\rho_b$ 、 $m_{ss}$  等可从第一篇中的 (1a) (1b) (1c) (1d) (4c) (5a) 得到。下面, 定出其它参数的来源公式,

$$n_i = M_b/m_{ss} \quad (8a)$$

$$m_{ss} \text{ 的波长 } \lambda_{ss} = Ch/(2\pi m_{ss} C^2), \text{ 由于 } m_{ss} C^2 \times 2t_s = h/2\pi = I_0, \text{ 所以,} \quad (8b)$$

$$\lambda_{ss} = 2C t_s = 2R_b, \text{ 而频率 } \nu_{ss} = C/\lambda_{ss} \quad (8c)$$

$$t_s = R_b/C \quad (8d)$$

$$E_r = m_{ss} C^2 \quad (8e)$$

由于  $t_b = 10^{-27} M_b^3$ , 所以  $-d t_b = 3 \times 10^{-27} M_b^2 dM_b$ 。如果使  $dM_b = 1$  个  $m_{ss}$ , 则  $-d t_b$  就是黑洞发射 2 个  $m_{ss}$  之间所需的间隔时间。

$$-d t_b \approx 3 \times 10^{-27} M_b^2 dM_b = 3 \times 10^{-27} M_b \times M_b m_{ss} \approx 0.356 \times 10^{-36} M_b \quad (8e)$$

$I_0$  是  $m_{ss}$  的信息量, 即最小单位信息量 1 比特。所有  $m_{ss}$  的信息量都等于  $I_0 = h/2\pi$ , 而与  $M_b$  和  $m_{ss}$  的大小无关。 $I_m$  是黑洞  $M_b$  的总信息量,  $I_m = 4GM_b^2/C$  (63d)。

从前面可知, 一旦在新的最小黑洞  $M_{bm}$  在普朗

表二: 7种不同类型黑洞其在视界半径 $R_b$ 上的性能参数值的计算结果<sup>[4]</sup>

黑洞	#1 最小黑洞	#2 微型黑洞	#3 中型黑洞	#4 月亮质量黑洞	#5 恒星级黑洞	#6 巨型黑洞	#7 我们宇宙黑洞
$M_b$ (g),	$10^{-5} \text{g}$	$10^{15} \text{g}$	$2 \times 10^{18} \text{g}$	$10^{26} \text{g}$	$6 \times 10^{33} (3M)$	$10^{42} \text{g} (10^9 M)$	
$R_b$ (cm),	$1.5 \times 10^{-33}$	$1.5 \times 10^{-13}$	$3 \times 10^{-10}$	$1.5 \times 10^{-2}$	$9 \times 10^5$	$1.5 \times 10^{14}$	
$T_b$ (k),	$0.8 \times 10^{32}$	$0.8 \times 10^{12}$	$0.4 \times 10^9$	8	$1.3 \times 10^{-7}$	$7 \times 10^{-16}$	
$t_b$ (s,yrs),	$10^{-42} \text{s}$	$10^{10} \text{yrs}$	$8 \times 10^{27}$	$10^{44} \text{yrs}$	$10^{66} \text{yrs}$	$10^{92} \text{yrs}$	
$\rho_b$ (g/cm <sup>3</sup> ),	$7 \times 10^{92}$	$7 \times 10^{52}$	$2 \times 10^{46}$	$7 \times 10^{30}$	$1.5 \times 10^{15}$	$7 \times 10^{-2}$	
$m_{ss}$ (g),	$10^{-5}$	$10^{-24}$	$10^{-27}$	$10^{-36}$	$1.6 \times 10^{-44}$	$10^{-52}$	

$n_i$ , $10^{122}$	1	$10^{39}$	$4 \times 10^{46}$	$10^{62}$	$4 \times 10^{77}$	$10^{94}$
$\lambda_{ss}(\text{cm})$ , $\frac{3 \times 10^{28}}{3 \times 10^5}$	$3 \times 10^{-33}$	$3 \times 10^{-13}$	$6 \times 10^{-10}$	$3 \times 10^{-2}$	$1.8 \times 10^6$	$3 \times 10^{14}$
$v_{ss}(\text{s}^{-1})$ , $\frac{10^{43}}{10^{-18}}$	$10^{43}$	$10^{23}$	$0.5 \times 10^{20}$	$10^{12}$	$0.17 \times 10^{-5}$	$10^{-4}$
$t_s(\text{s})$ , $\frac{0.5 \times 10^{18}}{0.5 \times 10^{18}}$	$0.5 \times 10^{-43}$	$0.5 \times 10^{-23}$	$10^{-20}$	$0.5 \times 10^{-12}$	$3 \times 10^{-5}$	$0.5 \times 10^4$
$E_t(\text{erg})$ , $\frac{10^{16}}{10^{-45}}$	$10^{16}$	$10^{-3}$	$10^{-7}$	$10^{-15}$	$10^{-23}$	$10^{-31}$
$t_c(\text{s})$ , $\frac{0.6 \times 10^{18}}{0.6 \times 10^{18}}$	$0.6 \times 10^{-43}$	$0.6 \times 10^{-24}$	$0.6 \times 10^{-21}$	$0.6 \times 10^{-12}$	$0.6 \times 10^{-4}$	$0.6 \times 10^4$
$I_m(I_0)$ , $\frac{I_0}{10^{122} I_0}$	$I_0$	$10^{39} I_0$	$4 \times 10^{46} I_0$	$10^{62} I_0$	$4 \times 10^{77} I_0$	$10^{94}$

§ 1. 表二中的数据是研究黑洞和宇宙起源的宝库，并将黑洞理论和宇宙起源学紧密地联系在一起。

表二中黑洞质量  $M_b$  从  $10^{-5} \text{g} \sim 10^{56} \text{g}$  就是我们宇宙从诞生到现今的膨胀过程和演变历史。在连续膨胀过程中，黑洞由小逐渐变大，列举上面 7 种黑洞，各有其代表意义。

我们宇宙在 137 亿年前诞生于无数宇宙最小黑洞  $M_{bm} \approx 10^{-5} \text{g}$  及其后的碰撞与合并，膨胀而成为现今  $M_u = 10^{56} \text{g}$  的宇宙大黑洞。如果现今宇宙大黑洞外面已无能量-物质可被吞噬，宇宙黑洞就会一直发射霍金辐射，在经过约  $10^{134}$  年以后，收缩成为  $M_{bm} \approx 10^{-5} \text{g}$  的最小黑洞消亡在普朗克领域。如果宇宙黑洞外尚有能量-物质可供吞噬，那么，宇宙黑洞就会在吞噬完所有能量-物质后，发射霍金辐射而收缩，最后收缩成为  $M_{bm} \approx 10^{-5} \text{g}$  的最小黑洞而消亡。但宇宙的寿命就会大大的增加，而  $\gg 10^{134}$  年。

§ 2. #1~#6 的 6 种原生小黑洞都不可能存在于今天的宇宙中。下面公式中， $t_{up}$  是宇宙特征膨胀时间， $\rho_0$  为其相对应的宇宙密度。

$$t_{up} = (3/8\pi \rho_0 G)^{1/2} \quad (8a)$$

在  $t_{up}$  约为宇宙宇宙诞生后  $t_{up} = 40$  万年时，宇宙刚结束辐射时代 Radiation Era，此时宇宙密度  $\rho_0 \approx 10^{-20} \text{g/cm}^3$ ，而#6 黑洞的密度  $\rho_b > 10^{-1} \text{g/cm}^3$ 。在辐射时代结束之前，从宇宙背景辐射图显示，宇宙内部的能量-物质密度是相当均匀的，相互转化的。这些原初黑洞只能与紧贴的其它黑洞合并而随着宇宙的膨胀而膨胀，不可能收缩而保存下来。#5、#6 号黑洞是宇宙膨胀到物质统治时代后，由于辐射与物质的分离，辐射温度的降低比粒子温度的降低快得多，大量的物质粒子才会收缩成为后生的#5、#6 黑洞。

不管是原生黑洞，还是后生黑洞，只要其  $M_b$  相同，其它的一切特性都完全相同。

§ 3. #1 最小黑洞  $M_{bm} = 1.09 \times 10^{-5} \text{g}$ ；是产生我们宇宙的原生最小黑洞。  $N_{bu} = 10^{61}$  个  $M_{bm}$  的不断地合并

与碰撞形成了我们宇宙的原初暴涨，他们不停地合并又造成了宇宙黑洞的膨胀。它们是宇宙中有最高能量密度和温度的粒子，也是宇宙中寿命最短的粒子，寿命  $10^{-44}$  秒。

§ 4. #2 微型黑洞 = 原初宇宙小黑洞  $M_{bom} \approx 10^{15} \text{g}$ ，它的寿命与宇宙的年龄相当。霍金在 70 年代曾预言它们可能存在于宇宙空间。上面已论述了它们不可能残存至今。它发射的霍金辐射  $m_{ss}$  相当于质子质量。它的总能量有  $M_b \approx 10^{39}$  个质子，只有一个原子核的大小。  $10^{39}$  是狄拉克大数假说中的大数。

§ 5. #3 中型黑洞。  $M_b \approx 10^{19} \text{g}$ ；其霍金辐射粒子  $m_{ss}$  的质能  $m_c \approx 10^{-27} \text{g} \approx$  电子质量。

§ 6. #4 月亮质量黑洞  $M_b \approx 10^{26} \text{g}$ ；它们在其视界半径  $R_b$  上的温度  $T_b \approx 2.7 \text{k}$ ，即宇宙的微波背景辐射的温度 2.7k。这就是说，如果在宇宙空间有一个孤立的  $M_b < 10^{26} \text{g}$  黑洞，其温度  $T_b > 2.7 \text{k}$ ，它就无法吞噬宇宙中的能量，只能向宇宙空间发射相当于  $m_{ss} > 10^{-36} \text{g}$  能量的辐射，而收缩其体积，直到最后收缩成为  $M_{bm} \approx 10^{-5} \text{g}$  最小黑洞在普朗克领域产生一阵最强烈的  $\gamma$  射线暴而消亡。如果这个孤立的  $M_b > 10^{26} \text{g}$ ，其温度  $T_b < 2.7 \text{k}$ ，它就会吞噬完其周围的能量后，再发射霍金辐射而收缩，最后收缩成为  $M_{bm} \approx 10^{-5} \text{g}$  最小黑洞在普朗克领域产生一阵最强烈的  $\gamma$  射线暴而消亡。

§ 7. #5 恒星级黑洞  $M_b \approx 6 \times 10^{33} \text{g} (3M)$ ；这类黑洞是后生的、它们是确实存在于宇宙空间的实体。由于新星或超新星的爆炸后，其中心的残骸在巨大的内压力下塌缩而成。也有可能由于双星系统中的中子星在吸收其伴星能量-物质后，当质量超过  $3M$  的奥本海默-沃尔科夫极限时，就会塌缩成一个恒星级黑洞。

由于宇宙中多双星系统，此类黑洞大多数隐于双星系统中。由于其温度  $T_b \approx 10^{-7} \text{k}$ ，即  $T_b \ll 2.7 \text{k}$ ，所以它只会吸收其伴星和其周围的能量物质而继续增长其质量。它的寿命一般大于  $10^{66}$  年，而所发射的金辐射的能量非常微弱，相当于  $m_{ss} \approx 10^{-44} \text{g}$ 。实际上，尚无确



切的证据显示恒星级黑洞是如何形成的。

**§ 8 ; #6 巨型黑洞  $M_b \approx (10^7 \sim 10^{12}) M$  :** 此巨型黑洞存在于星系团和星系的中心,在宇宙进入物质为主的年代后的早期形成。巨型黑洞内还可能存在着有恒星级黑洞。类星体是其中的一些巨型黑洞的少年时期。由于它们都处在星系团的中心,其外围尚有大量的能量-物质可供吞噬,因此,它们还在继续长大。直到吞噬完外围所有的能量-物质后,才会极慢地发射极微弱的霍金辐射。其寿命将大到  $10^{76-101}$  年。<sup>[3]</sup>

**§ 9 ; #7 我们宇宙巨无霸黑洞  $M_{bu} \approx 10^{56} g$  :** 上面已完全证实我们现在的宇宙就是一个宇宙大黑洞。哈勃定律所反映的宇宙膨胀规律就是我们宇宙黑洞吞噬外界能量-物质所造成的膨胀规律。我们宇宙黑洞现在还在膨胀,这表明宇宙外面还有能量-物质可供吞噬。我们看不见宇宙外面还有多小能量-物质可被吞噬。我们宇宙黑洞现在发射的霍金辐射粒子  $m_{ss} \approx 10^{-66} g$ , 约隔  $10^{12}$  年才发出另外一个  $m_{ss}$ 。而  $10^{12}$  年比宇宙现在的年龄 137 亿年还长呢。

**§ 10 ; 不同大小质量黑洞  $M_b$  的霍金辐射  $m_{ss}$  有不同的本质和特性。**

第一;孤立的 #1 最小黑洞只能爆炸解体在普朗克领域,爆炸产生最高能量 射线。

第二; #1 最小黑洞~ #2 微型黑洞  $10^5 g$  : 它们的霍金辐射  $m_{ss}$  质子质量  $p_m = 1.66 \times 10^{-24} g$  最小黑洞  $10^{-5} g$ 。它们是高能量的 射线。

第三;在 #2 微型黑洞  $10^5 g$  ~ #3 中型黑洞  $2 \times 10^{18} g$  之间的黑洞,它们所发射的霍金辐射  $m_{ss}$  的质量是介于质子质量  $p_m$  ~ 电子质量  $e_m$  的 射线。

第四;在 #3 中型黑洞  $2 \times 10^{18} g$  ~ #5 恒星级黑洞  $6 \times 10^{33} g$  之间的黑洞,它们所发射的霍金辐射  $m_{ss}$  的波长是介于 x 射线 ~ 最长的无线电波的阶段。

第五; #5 恒星级黑洞  $6 \times 10^{33} g$  ~ #7 我们宇宙大黑洞之间的黑洞,它们所发射的霍金辐射  $m_{ss}$  的波长应该是引力波。

**§ 11. 将 #1 最小黑洞  $M_{bm} = 10^{-5} g$  与 #7 我们宇宙大黑洞  $M_{bu} \approx 10^{56} g$  的数值比较如下:**

质量比值,  $M_{b7}/M_{b1} = 10^{56}/10^{-5} = 10^{61}$ ;

视界半径比值,  $R_{b7}/r_{b1} = 1.5 \times 10^{28}/1.5 \times 10^{-33} = 10^{61}$ ;

时间比值,  $t_{b7}/t_{b1} = 0.5 \times 10^{18}/0.5 \times 10^{-43} = 10^{61}$ ;

温度比值,  $T_{b7}/T_{b1} = 7 \times 10^{-30}/0.8 \times 10^{32} = 10^{-61}$ ;

寿命比值,  $t_{b7}/t_{b1} = 10^{142}/10^{-42} = 10^{184}$ ;

$m_{ss}$  的比值,  $m_{ss1}/m_{ss7} = 10^{-5}/10^{-66} = 10^{61}$ ;

$m_{ss}$  的数目-ni 比值,  $ni_7/ni_1 = 10^{122}/1 = 10^{122}$ ;

信息量  $I_m$  的比值,  $I_{m7}/I_{m1} = 10^{122}/1 = 10^{122}$

--d<sub>b</sub> 是每发生一个  $m_{ss}$  的间隔时间的比值 =  $d_{b7}/d_{b1} = 3 \times 10^{19}/3 \times 10^{-42} = 10^{61}$

**§ 12. 关于宇宙黑洞的几点另外的结论:**

第一;从上面的比值来看, #7 黑洞与 #1 各种性能参数的比值,凡与黑洞质量  $M_b$  成正比或成反比的参数,其比值均为  $10^{61}$ ; 凡与黑洞质量  $M_b^2$  成比例的

参数,其比值均为  $10^{122}$ ; 黑洞寿命与  $M_b^3$  成比例,所以其比值为  $10^{183}$ 。这些准确的数值证明了黑洞理论和所有公式的正确性和圆满的自治性,也证明了黑洞各参数之间的准确的、简单的、单值的关系。一旦黑洞的总值能量  $M_b$  确定了,其它的所有性能参数也就准确而单值地被跟着确定了。同时,也证明了广义相对论中无准确数值的‘奇点’的荒谬性。所以。相同的  $M_b$  的黑洞性能,就是其视界半径上的性质是完全相同的,但是,各黑洞内部的物质结构、运动状态、物质能量的分布是可以不相同的,黑洞愈大,其内部的差别愈大。#6 巨型黑洞里面甚至还可以存在着有 #5 恒星级黑洞。

第二; 1998 年,澳大利亚和美国的 2 个科学家小组在测量遥远的 Ia 型超新星爆炸时,发现了我们宇宙的加速膨胀现象。这种加速膨胀发生在宇宙诞生后约 50 亿年时。现在主流的科学将产生加速膨胀的原因归于宇宙中出现了有排斥力的暗能量。作者在【1-8】文章中指出,宇宙的加速膨胀可能来源于我们宇宙在其 50 亿年时与宇宙中另外一个宇宙大黑洞的碰撞。因为黑洞在加速吞噬外界的能量-物质时,会产生其视界半径的加速扩大。由宇宙加速膨胀现象的产生,作者指出这也是多宇宙存在的体现。宇宙存在的实况可能就是一层又一层地大黑洞里套着一些小黑洞。每一个黑洞都是一个独立地、与外界隔离的系统或者说视界。

第三;本来黑洞理论和宇宙学都来源于经典理论。因此,用经典理论和公式是能解决其中许多重大而悬而未决问题的,经典理论并未走到尽头。这或许就是作者在文中能有幸的解决许多重大问题的缘故吧。

====全文完====

**【参考文献】:**

[1]. 对黑洞的新观念和新的完整论证: 黑洞内部根本没有奇点(上篇)

====所有黑洞之最后命运就是由于发射霍金辐射而收缩成为宇宙中的最小引力黑洞( $M_{bm} \approx 10^{-5} g$ ) 在爆炸中消亡于普朗克领域 Planck Era, 而不是塌缩成为奇点====

[http:// sciencepub.net/academia/aa0207](http://sciencepub.net/academia/aa0207), Academia Arena 2010;2(7):. (ISSN 1553-992X).

[2]。对宇宙起源的新观念和新的完整论证: 宇宙不可能诞生于奇点(下篇) = 我们宇宙诞生于大量原初最小黑洞( $M_{bm} \approx 10^{-5} g$ ) 的合并, 而不是“奇点”或“奇点的大爆炸”=

[http:// sciencepub.net/academia/aa02012](http://sciencepub.net/academia/aa02012), Academia Arena 2010;2(12):. (ISSN 1553-992X).

[[3]。只有用经典理论才能正确地解释黑洞的霍金辐射

<http://sciencepub.net/academia/aa0303>. [Academia

Arena, 2011;3(3): (ISSN 1553-992X).

[4]. 黑洞  $M_b$  的霍金辐射  $m_{ss}$  的信息量  $I_0 = h/2\pi$ , 一个黑洞的总信息量  $I_m = 4GM_b^2/C$ , 黑洞在膨胀时, 信息量是增加的.

<http://sciencepub.net/academia/aa0303>. [Academia Arena, 2011;3(3): (ISSN 1553-992X).

[5]. 宇宙黑洞的演化过程、宇宙原初小黑洞  $M_{bom} \approx 10^{15}g$  和大数假说

<http://sciencepub.net/academia/aa0302>. [Academia Arena, 2011;3(2): (ISSN 1553-992X).

[6]. 广义相对论方程的根本缺陷是没有热力学效应, 既无热力以对抗引力

<http://www.sciencepub.net/academia/aa0212/> Academia Arena 2010;2(12):1-5]. (ISSN 1553-992X).

[7]. 为什么由广义相对论方程的各种解都会推导出“奇点”和其它的诸多错误结论

<http://sciencepub.net/academia/aa0207>. [Academia Arena, 2010;2(7): (ISSN 1553-992X).

[8]. 对宇宙加速膨胀的最新解释: 这是由于在宇宙早期所发生的宇宙 2 黑洞间的碰撞所造成的

<http://sciencepub.net/academia/aa0207/>, [Academia Arena, 2010;2(7):] (ISSN 1553-992X).

[9]. 人类也许永远不可能制造出任何真正的人造引力(史瓦西)黑洞

<http://www.sciencepub.net/academia/0104>. [Academia Arena, 2009;1(4)]. (ISSN 1553-992X).

[10]. 为什么狄拉克不能从他的“大数假说”得出正确的结论?

<http://www.sciencepub.net/newyork/0205/> [New York Science Journal. 2009;2(5):] (ISSN1554-0200

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## Microbiological Quality and Proximate Composition of Peanut cake (*Kulikuli*) in Nigerian Markets

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**Abstract:** Peanut cake (*Kulikuli*) is a groundnut-based snack that is consumed by all age range among the indigenous West African populace. It is also used as a major ingredient in poultry feed formulation. However, there is scarcity of data with regards to the microbiological quality of *Kulikuli* across Nigeria or other *Kulikuli* consuming West African states. In this study, 49 *Kulikuli* samples obtained from markets in nine districts within Nigeria were subjected to microbial and proximate analyses in order to ascertain the quality of this food material. All the samples had bacterial and fungal contamination at varying levels ranging from  $4.2 \times 10^6$  to  $1.0 \times 10^7$  cfu/g for bacteria, and  $1.1 \times 10^3$  to  $2.8 \times 10^4$  cfu/g for fungi, however, not all samples were contaminated with pathogenic Gram-negative bacteria. The contaminating enterobacteria included species of *Escherichia*, *Enterobacter*, *Salmonella*, *Shigella*, *Proteus* and *Klebsiella*. The enterobacteria gave varying haemolytic reactions. Species of *Aspergillus*, *Fusarium*, *Penicillium*, *Rhizopus* and *Trichoderma* were the fungi recovered from the samples. *Aspergillus* species were the most commonly isolated fungi and had a significantly ( $P < 0.05$ ) different relative density of 84.7% from other fungi. The data obtained for proximate composition varied from location to location. Crude protein was significantly ( $P < 0.05$ ) higher than all other parameters in the market and control samples. Crude protein and crude fat contents were significantly ( $P < 0.05$ ) higher in control samples than all market samples. Correlation analysis showed an inverse relationship between the total bacterial and fungal loads and individual proximate parameters in the *Kulikuli* samples. The data obtained in this study showed that the presence of contaminating microbes was responsible for depreciation in nutritional value in *Kulikuli*.

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**Keywords:** Peanut cake, *Kulikuli*, Fungi, Enterobacteriaceae, Microbial quality, Proximate, Food quality.

### 1. Introduction

Peanut cake (*Kulikuli*) is a groundnut-based snack indigenous to the West African coasts. Being a snack, it is consumed by all age range but more specifically by school-age children and the middle aged. It is also used as a major ingredient in poultry feed formulation (Akano and Atanda, 1990). *Kulikuli* is usually produced from groundnut during groundnut oil extraction or otherwise, and it is simply regarded as the fried residue obtained from this process (Adebesin et al., 2001). It has been reported to be rich in protein and crude fat similar to its parent material, groundnut (Aletor and Ojelabi, 2007; Oladimeji and Kolapo, 2008).

Although peanut cake is consumed by humans across some West African states, only very few data are currently available on this food material in terms of its safety and nutritional status. Interestingly, the available data originate from Nigeria and have focused on the microbiological quality of *Kulikuli*, nutritive

attributes and functional characteristics (Adebesin et al., 2001; Aletor and Ojelabi, 2007). The scarcity of data in regards to the microbiological quality of *Kulikuli* across Nigeria or other *Kulikuli* consuming West African states may be due to the fact that this product is mostly consumed by the low income populace and therefore not seen as a major food. However, Aletor and Ojelabi (2007) reported that this snack could serve as a major protein supplement since it contained high crude protein.

The enterobacteria are a large group of related bacteria that are capable of food and water contamination through faecal sources. Many of the strains and species are known to be enterotoxigenic and contribute a major quota to the many diarrheal illnesses experienced by man (Talaro and Talaro, 2002). Therefore, in the bid to enhance human health and secure food safety as well as public health enlightenment to food-borne illnesses, there is a need to evaluate the microbial load of this snack available

for human consumption in markets across Nigeria. Also, considering the fact that information obtained via questionnaire indicates that many school-age children consume this product that is known to be locally processed and under packaged, there is an urgent need to ascertain the cause of the frequent diarrheal cases reported by patients of this age group to nearby clinics after history of contact with this food. In essence, this research aims at evaluating *Kulikuli* samples obtained from various markets across Nigeria for microbial contamination and proximate changes. This will help to determine the food quality, relationship between microbial presence and count in this food and nutrient depletion, and possible associated public health risks posed by the consumption of this snack.

## 2. Materials and Methods

### 2.1 Survey and Sample collection

A survey was conducted in markets in nine districts within four agro-ecological zones of Nigeria in order to assess the microbiological quality and proximate profile of *Kulikuli* available for human consumption. The survey involved the acquisition of information (by questionnaire) from several categories of individuals that come in contact with this food product and subsequent collection of the *Kulikuli* samples for analysis. The categories of individuals included producers, traders and consumers while the agro-ecological zones (AEZ) and districts were Humid forest (HF) (Oshodi, Mile 2, Ikorodu), Derived Savannah (DS) (Abeokuta, Sagamu, Ibadan), Southern Guinea Savannah (SGS) (Minna) and Northern Guinea Savannah (NGS) (Chencheya and Kaduna Central). A total of 49 *Kulikuli* samples were collected during the survey. Forty-six of the samples were market samples while the other three were obtained from the producers at the point of production in Chencheya district. The market samples were collected from five traders in each district with the exception of Sagamu and Ibadan where *Kulikuli* from three and eight traders were sampled respectively. The producer samples were used as control samples in the proximate composition analysis.

Each sample collected from a trader or producer weighed approximately 1.5kg and was a bulk sample obtained by adding three parts each of about 500g representative sample collected from various parts of the traders' storage bags or trays. Each bulk sample was collected into a transparent *zip-lock* bag, comminuted immediately in order to reduce the particle size and stored at 4 °C prior to further analysis within 48 hours.

### 2.2 Bacteriological analysis of *Kulikuli* samples

Each sample was subjected to bacteriological analysis to determine the total bacterial load in consumable *Kulikuli*. The contaminating enterobacteriaceae were also determined in each sample according to the ISO Standard 7402 (1993) for Enterobacteriaceae plate count. The enterobacteria were sought for as an index of the quality of this product since it is known that some of the bacteria within this class are used as indicators of faecal contamination in food and drinks. One gram of each sample was suspended in 9ml of 2% sterile peptone water and serially diluted. Aliquots were pour-plated in triplicates on Nutrient and MacConkey agars. The nutrient agar plates were used for the Total bacterial count (TBC) in colony forming units per gram (cfu/g) while the MacConkey plates were for initial isolation of enterobacteria. Each distinct colony on MacConkey plate was picked and purified twice on MacConkey, Eosin-Methylene Blue and Salmonella-Shigella agars to ascertain morphological consistency. Plates were incubated at 37 °C for 24 hours. The purified colonies were subjected to biochemical characterization according to Cowan and Stell (1993) and Brown (2005).

A blood agar haemolytic test was conducted for all distinct colonies of contaminating enterobacteria so as to determine their virulence potential. The data obtained were reported as percentage haemolytic and non haemolytic enterobacteriaceae in each sampled location. The occurrence of each genus of Gram-negative bacteria in each sample was recorded as their relative density (*Rd*).

### 2.3 Mycological analysis of *Kulikuli* samples

The method of Samson et al. (1995b) was employed in the mycological analysis of each *Kulikuli* sample as a contribution to the assessment of microbial quality of the food material. Ten grams of each sample was diluted in sterile distilled water and pour-plated on Plate Count agar supplemented with 0.4g/L streptomycin sulphate and 0.2g/L chloramphenicol. The colonies on the Plate Count agar plates were counted using a digital illuminated colony counter (KA00-74A) and recorded as colony forming units per gram (cfu/g) for the Total fungal count (TFC). Each colony was transferred to freshly prepared acidified Potato Dextrose agar plates for proper identification. Plates were incubated at 31 °C for 72 hours. Fungal identification was by assessing macro- and micro-characters specific for each genus and comparing the data with descriptions and illustrations in Raper and Fennel (1965) and Samson et al. (1995a). The

distribution of contaminating fungal genera in each sample was reported as relative density (*Rd*) of each genus according to the definitions of Ezekiel et al. (2008).

## 2.4 Proximate analysis of *Kulikuli* samples

The proximate composition of each *Kulikuli* sample was determined as an index for monitoring the product quality and deducing the possible storage duration of the food material since production till date. The parameters assessed were moisture content, crude protein, crude fat and ash content, all expressed as percentage. The samples collected from producers as described above were used as control samples. The Kjeldahl, soxhlet, dry ashing and oven drying to constant weight methods of AOAC (1995) and Nielsen (2002) were followed for the analysis of crude protein, crude fat, ash and moisture contents, respectively. The pH of the samples was also determined.

## 2.5 Data Analysis

The One-way ANOVA test was used for comparison of means of TBC across agro-ecological

zones, overall *Rd* (%) for fungal genera and means of individual nutrient profiles in the proximate analysis data. The means were separated for test of significance by the Duncan's Multiple Range Test at  $P = 0.05$ .

## 3. Results

### 3.1 Bacterial load in *Kulikuli* from Nigerian markets

A total of 49 *Kulikuli* samples were analyzed for total bacterial load. All the samples had bacterial contamination at varying levels. Samples from Oshodi had the highest total bacterial count (TBC) of  $1.0 \times 10^7$  cfu/g while those from Sagamu had the least,  $4.2 \times 10^6$  (Table 1). Generally, samples from locations within the HF had higher TBC values ( $\geq 8.5 \times 10^6$  cfu/g) resulting in a higher significant ( $P < 0.05$ ) mean TBC for HF ( $9.6 \times 10^6$  cfu/g) than the other AEZs excluding SGS. The mean TBC for SGS was not calculated since this AEZ had samples from only one location. The DS and NGS had the same mean TBC value of  $6.3 \times 10^6$  cfu/g.

Table 1. Bacterial load and distribution of Gram-negative bacteria in *Kulikuli* sold in markets within four agro-ecological zones in Nigeria

†AEZ	Location	*TBC (cfu/g)	Relative density ( <i>Rd</i> ) (%) of genera of Gram-negative bacteria occurring in samples								%Haemolytic	
			<i>Enterobacter</i>	<i>E. coli</i>	<i>Salmonella</i>	<i>Shigella</i>	<i>Proteus</i>	<i>Pseudomonas</i>	<i>Klebsiella</i>	<i>Flavobacterium</i>	H	nH
HF	Oshodi	$1.0 \times 10^7$	---	---	25.0	75.0	---	---	---	---	100	0
	Mile 2	$8.5 \times 10^6$	---	---	42.9	57.1	---	---	---	---	71.4	28.6
	Ikorodu	$9.9 \times 10^6$	---	---	20.0	40.0	40.0	---	---	---	100	0
	Mean	$9.6 \times 10^{6a}$	---	---	---	---	---	---	---	---	---	---
DS	Abeokuta	$5.1 \times 10^6$	28.6	14.3	7.1	28.6	---	---	21.4	---	61.5	38.5
	Sagamu	$4.2 \times 10^6$	75.0	---	---	---	25.0	---	---	---	24.0	75.0
	Ibadan	$7.8 \times 10^6$	---	---	12.5	12.5	12.5	62.5	---	---	50.0	50.0
	Mean	$6.3 \times 10^{6b}$	---	---	---	---	---	---	---	---	---	---
SGS	Minna	$6.4 \times 10^6$	---	---	---	50.0	---	16.7	---	33.3	33.3	66.7
NGS	Chencheya	$5.4 \times 10^6$	---	---	33.3	55.5	---	11.1	---	---	77.7	22.2
	Kaduna	$7.1 \times 10^6$	37.5	---	12.5	12.5	---	37.5	---	---	25.0	75.0
	Mean	$6.3 \times 10^{6b}$	---	---	---	---	---	---	---	---	---	---
Overall <i>Rd</i> (%)	---	---	15.4	3.1	16.9	33.9	6.2	15.4	4.6	3.1	59.4	40.6

†AEZ: agroecological zones; HF: Humid Forest, DS: Derived, SGS: Southern Guinea and NGS: Northern Guinea Savannah

\*TBC (cfu/g): Total bacterial count in colony forming units per gram

~% Haemolytic refers to proportion of haemolytic to non haemolytic strains of enterobacteriaceae in each location; H = Haemolytic strains, nH = non haemolytic

Mean cfu/g values in a column with different alphabets are significantly different at  $P < 0.05$

### 3.2 Incidence of Gram-negative bacteria in *Kulikuli* from Nigerian markets

A total of 63 Gram-negative bacteria belonging to 6 enterobacteria genera (*Escherichia*, *Enterobacter*, *Salmonella*, *Shigella*, *Proteus* and *Klebsiella*) and two

non enterobacteria genera (*Pseudomonas* and *Flavobacterium*) were recovered from the *Kulikuli* samples (Table 1). *E. coli* and *Klebsiella* were detected only in samples collected from Abeokuta and they occurred as 14.3% and 21.4% of the total Gram-

negative bacteria in *Kulikuli* from Abeokuta, respectively. *Flavobacterium* was detected only in samples from Minna at a proportion of 33.3% of the total contaminating Gram-negative bacteria from Minna. *Shigella* was detected in relatively high proportions in samples from all locations except Sagamu where it was not detected. Similarly, *Salmonella* was present in samples from all locations except Sagamu and Minna, although at low to moderate proportions. *Proteus* was detected in samples from DS and HF while *Pseudomonas*, in samples from other AEZs excluding HF. *Enterobacter* was only recovered from samples obtained from Abeokuta, Sagamu and Kaduna central.

In terms of the overall percentage proportionate occurrence of each genus, *Shigella* had the highest *Rd* value (33.9%) while *E. coli* and *Flavobacterium* occurred the least (*Rd* =3.1%). *Salmonella* occurred as 50% of the proportion of *Shigella*. Haemolytic enterobacteria strains were detected at varying proportions in samples from all locations (Table 1). However, all enterobacteria in samples from Oshodi and Ikorodu were haemolytic while 50% of the enterobacteria in *Kulikuli* from Ibadan were haemolytic.

### 3.3 Fungal load in *Kulikuli* samples from Nigerian markets

All *Kulikuli* samples analyzed in this study had fungal contamination at varying levels. A total of 403 fungal isolates belonging to 5 identified genera (*Aspergillus*, *Fusarium*, *Penicillium*, *Rhizopus* and *Trichoderma*) and other unidentified genera were recovered from the analyzed samples. Samples from Ikorodu had the highest total fungal count (TFC) of  $2.8 \times 10^4$  cfu/g while those from Sagamu had the least fungal load,  $4.7 \times 10^2$  cfu/g (Table 2). The mean fungal load of samples from HF ( $1.7 \times 10^4$  cfu/g) was higher than those in other AEZs, although there was no significant ( $P > 0.05$ ) difference in the fungal loads across all AEZs.

*Aspergillus* species were recovered from samples in all locations at *Rd* >60% while *Fusarium* species were detected in samples from all locations except Mile 2. *Penicillium* species were present in samples from all locations except Mile 2, Sagamu and Minna while *Rhizopus* species occurred only in samples from Mile 2, Abeokuta, Ibadan and Kaduna central. *Trichoderma* was present in samples from Oshodi, Mile 2, Abeokuta and Kaduna central. On the overall, the incidence of *Aspergillus* species was the highest (*Rd* =84.7%) being

Table 2. Occurrence and distribution of moulds in *Kulikuli* sold in markets within four agro-ecological zones in Nigeria

<sup>†</sup> AEZ	Location	*TFC (cfu/g)	Relative density ( <i>Rd</i> ) (%) of fungal genera occurring in samples					Others
			<i>Aspergillus</i>	<i>Fusarium</i>	<i>Penicillium</i>	<i>Rhizopus</i>	<i>Trichoderma</i>	
HF	Oshodi	$2.4 \times 10^4$	85.3	8.0	4.0	---	1.3	1.3
	Mile 2	$1.1 \times 10^3$	88.2	---	---	2.9	2.9	5.8
	Ikorodu	$2.8 \times 10^4$	79.2	13.0	3.9	---	---	3.9
	Mean	$1.7 \times 10^4$						
DS	Abeokuta	$1.5 \times 10^3$	83.8	5.4	2.7	5.4	2.7	---
	Sagamu	$4.7 \times 10^2$	85.7	14.3	---	---	---	---
	Ibadan	$5.2 \times 10^3$	91.6	3.8	3.1	1.5	---	---
	Mean	$3.2 \times 10^3$						
SGS	Minna	$2.7 \times 10^3$	95.2	4.8	---	---	---	---
NGS	Chencheya	$1.3 \times 10^3$	72.7	15.2	9.1	---	---	3.0
	Kaduna	$1.2 \times 10^3$	62.1	13.8	6.9	3.4	6.9	6.9
	Mean	$1.2 \times 10^3$						
Overall <i>Rd</i> (%)	---		84.7 <sup>a</sup>	7.5 <sup>b</sup>	3.4 <sup>bc</sup>	1.3 <sup>c</sup>	1.1 <sup>c</sup>	1.9 <sup>c</sup>

<sup>†</sup>AEZ: agroecological zones; HF: Humid Forest, DS: Derived, SGS: Southern Guinea and NGS: Northern Guinea Savannah

\*TFC (cfu/g): Total fungal count in colony forming units per gram

Overall *Rd* values (%) in a row with different alphabets are significantly different at  $P < 0.05$

significantly ( $P < 0.05$ ) higher than the proportion of all other fungal genera. *Trichoderma* occurred the least (*Rd* =1.1%) although its incidence was not significantly ( $P > 0.05$ ) different than the incidence of *Rhizopus* and other unidentified genera.

### 3.4 Proximate profile of *Kulikuli* from Nigeria

The parameters assessed in the proximate analysis of the *Kulikuli* samples varied from location to location. The mean moisture content in the market samples ranged from  $6.91 \pm 1.45$  to  $10.41 \pm 2.53$  while mean pH ranges were between  $7.17 \pm 0.7$  and  $7.72 \pm 0.9$ . Crude protein was significantly ( $P < 0.05$ ) higher than

all other assayed parameters (crude fat, ash content and moisture contents) in all market and control samples (Fig. 1). Crude protein and crude fat contents ( $39.7\pm 0.46$  and  $30.3\pm 0.91$  respectively) were significantly ( $P<0.05$ ) higher in control samples than all market samples (Fig. 1 and 2). Samples from NGS (Chencheya and Kaduna central) and SGS (Minna) had significantly ( $P<0.05$ ) higher crude protein contents

than other market samples (Fig. 1 and 2). *Kulikuli* samples collected from Sagamu had the least crude protein value ( $26.48\pm 0.35$ ). Crude protein in samples from HF ( $28.00\pm 2.01$ ) and DS ( $28.22\pm 2.09$ ) were significantly ( $P<0.05$ ) higher than the values obtained in samples from SGS and NGS but not significantly ( $P>0.05$ ) different from control value ( $28.7\pm 4.10$ ).

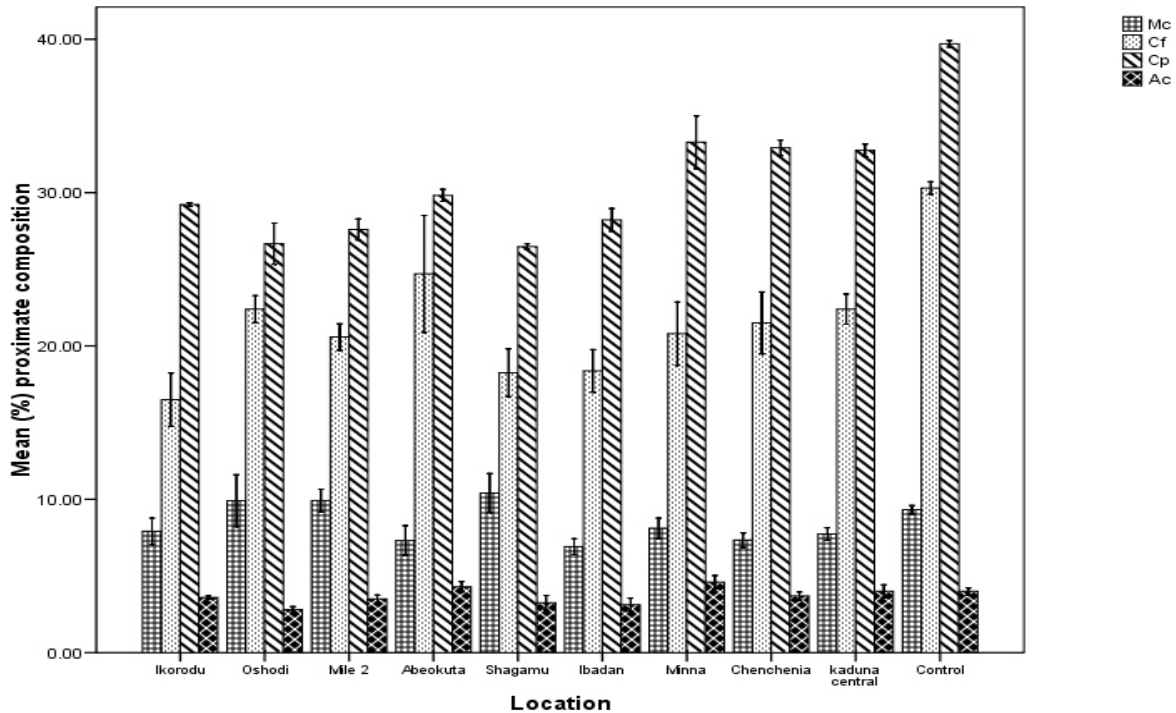


Figure 1. Proximate profile of *Kulikuli* sold in Nigerian markets

Mc: Moisture content; Cf: Crude fat; Cp: Crude protein; Ac: Ash content

Considering the crude fat analysis of samples, *Kulikuli* from Abeokuta had the highest residual crude fat ( $24.7\pm 8.53$ ) which was significantly ( $P<0.05$ ) higher than crude fat in market samples from Ikorodu, Sagamu and Ibadan only (Fig. 1). From the AEZ standpoint, crude fat in *Kulikuli* samples collected from NGS ( $21.95\pm 3.37$ ) was highest but not significantly ( $P>0.05$ ) different from samples in other AEZs (Fig. 2). Ash content was highest in samples from Minna ( $4.6\pm 0.96$ ) and least in those from Oshodi ( $2.8\pm 0.45$ ). No significant ( $P>0.05$ ) difference was observed in the ash contents of samples across AEZs.

Correlation analysis showed an inverse relationship between the total bacteria load and

individual proximate parameters in the *Kulikuli* samples. The same relationship was observed in the case of the total fungal load and individual proximate parameters in the samples. However, the relationship was higher between bacteria load and crude protein, and crude fat ( $r=-0.70$ ) than the fungal load ( $r=-0.37$ ). Conversely, a higher inverse relationship was observed between fungal load and ash content ( $r=-0.45$ ) than bacterial load and ash content ( $r=-0.42$ ).

#### 4. Discussion

In microbial analysis of food, the number and type of microbes present in the food material under examination reflect quality of the food and extent of

risk posed to the consumers (Lund et al., 2000). In this study, the *Kuli-kuli* samples were highly contaminated with bacteria including pathogenic enterobacteria. Fungi were also recovered although in lower counts as compared to the bacterial load in the samples. Our finding in this regard is in accordance with the reports of Akano and Atanda (1990) and Adebessin et al. (2001) who evaluated the microbial load of *Kulikuli* from Bauchi, a Northern Nigerian city, and found the bacterial counts to be higher than the fungal load. They also reported *Kulikuli* to have higher microbial count than other groundnut cereal-based products. Oladimeji

and Kolapo (2008) also stated that bacterial load tends to be significantly higher in food samples than fungal counts. This may be due to the fact that the generation time of bacteria is lesser than that of fungi especially moulds and also because bacteria being unicells, reproduce by binary fission unlike moulds which mostly divide after mycelia extension or spore development. The higher bacterial load in samples from Oshodi and the HF AEZ is a reflection of the number of handlers that come in contact with this food material in these locations which are highly populated as compared to other locations.

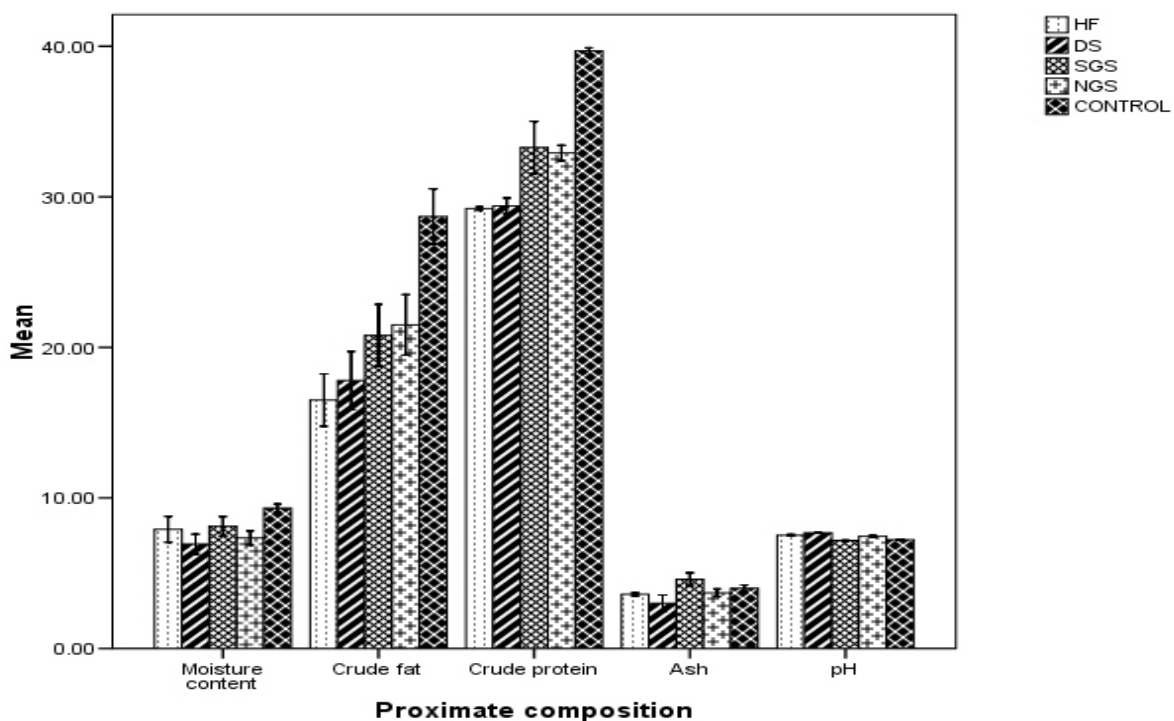


Figure 2. Comparison of proximate profile of *Kulikuli* from markets in four agro-ecological zones in Nigeria HF: Humid Forest, DS: Derived Savannah, SGS: Southern Guinea Savannah, NGS: Northern Guinea Savannah

The occurrence of enterobacteria especially indicator bacteria such as *E. coli* and *Salmonella* in the *Kulikuli* samples obtained in markets across Nigeria is of public health importance since these culprits reflect the poor quality of this product in circulation. The indicator bacteria alongside other isolated enterobacteria such as *Shigella*, *Klebsiella* and *Proteus* have been implicated in several human infections (Collee et al., 1997; Delost 1997; Nzeako et al., 2002). *Salmonella*, *E. coli* and *Shigella* are specifically known

for their potential to incite food poisoning and intoxications, some strains of which liberate enterotoxins (Lund et al., 2000; Nzeako et al., 2002; Talaro and Talaro, 2002; Adegoke, 2004; Miki et al., 2004). These bacteria are usually conveyed into food, drink or water by vectors or faecally-contaminated handlers who maintain a low level of hygiene (Lund et al., 2000; Nzeako et al., 2002). Therefore, the occurrence of these enterobacteria in *Kulikuli* samples available for human consumption in Nigeria is



alarming and poses great health hazard since their counts exceed the acceptable limits set by the International Commission on Microbiological Specification of Food (ICMSF). However, a greater risk is envisaged in Abeokuta where there was the singular isolation of *E. coli* and a high incidence of other enterobacteria than any other location. We may then infer that the producers, handlers and traders of this product in this location maintain a poor hygiene status and low sanitary standards. In addition, the occurrence of *Proteus*, *Pseudomonas* and *Klebsiella*, notable lower respiratory tract pathogens, in the *Kulikuli* samples create tension and may have resulted also from poor handling and transportation methods since it is known that this snack or roadside food is not usually well packaged and exposed to the touch of every potential buyer of this snack.

Considering the virulence of the enterobacteria in each location, it is evident that a high risk of haemorrhagic enterobacillosis is posed to the consumers of this product, majority of which are school-age children since it is well known that the haemolytic enterobacteria are usually more virulent than non-haemorrhagic strains (Finley and Falkow, 1988; Watanabe, 1988; Nowroozi and Hakemi vala, 2006). The high proportion of haemolytic enterobacteria in each location except Sagamu, Minna and Kaduna is alarming and may have contributed to the high incidence of severe gastroenteritis or other food-borne illnesses prevalent in those locations (data obtained from questionnaire analysis). The higher haemolytic incidence (%) as seen in Oshodi, Ikorodu, Chencheya and Abeokuta districts were the contributions mostly from *Shigella* and *Salmonella* species, indicating that the children who consume this snack daily may suffer or have suffered from severe shigellosis and *Salmonella* infections caused by haemolytic strains such as *Shigella dysenteriae*, *S. flexneri* and *Salmonella enterica* serovars Typhi and Paratyphi (Sharma et al., 2001; Oscarsson et al., 2002; Miki et al., 2004; Nowroozi and Hakemi vala, 2006)

The number and type of fungi recovered from the *Kulikuli* samples in this study is also of immense public health importance since some of the species are notable toxin producers while the others are mere saprophytes; inciting deterioration of the food material in their bid to adapt and survive in the microenvironment. The species of *Aspergillus*, *Rhizopus* and *Penicillium* isolated from our samples corroborate the findings of Adebisin et al. (2001) who reported these fungi as contaminants of *Kulikuli* alongside others which we did not recover or could not identify in this study. Gachomo et al. (2004) and Jimoh and Kolapo (2008)

reported these fungi together with *Fusarium* to be the major contaminating fungi of groundnut in storage. Therefore, their occurrence in this food product may have originated from the raw groundnut used in the individual *Kulikuli* processing as well as the post-production exposure of this marketed snacks to fungal spore resident in the air. The earlier may be a minor contributor as compared to the latter (exposure of snacks in markets to air-borne fungal spores) since the fungal count was higher in markets located in the HF AEZ than other AEZs and locations. The locations within the HF are well populated than other collection sites of this snack across Nigeria.

The presence of *Aspergillus* species such as *A. flavus* and *A. niger*, *Fusarium* species, *Penicillium* species and *Rhizopus* in the *Kulikuli* samples pose a toxicological threat to the consumers since majority of the strains of these fungal species are toxigenic (Akano and Atanda, 1990; Jimoh and Kolapo, 2008; Makun et al., 2010). *Rhizopus* is known to liberate a metabolite rhizonin A (Wilson et al., 1984) while aflatoxins, ochratoxins, fumonisins, trichothecenes, citrinin and patulin are well produced during metabolism by the other above mentioned fungi. In 1990, Akano and Atanda reported the presence of these fungi and aflatoxins in *Kulikuli* from Ibadan, Oyo state, Nigeria after the incidence of deaths resulting from consumption of aflatoxin-contaminated foods in Nigeria.

The contaminating bacteria and fungi of the *Kulikuli* samples in this study were thus found to be involved in the utilization of the nutrients inherent in this food material. This was evident in the significant ( $P < 0.05$ ) depreciation of the crude protein and crude fat contents of the market samples than the control samples. The high crude protein content of the control *Kulikuli* samples corroborates the reports of Aletor and Ojelabi (2007) who reported a high crude protein value of  $32.4 \pm 0.2$  for laboratory-made *Kulikuli* and Oladimeji and Kolapo (2008) who reported a very high 39.9% crude protein content of groundnut meant for *Kulikuli* production. Although our control samples were higher in crude protein value than reports of Aletor and Ojelabi, the crude fat they reported was higher than our data. It is interesting to note that the samples from the northern regions of Nigeria (NGS and SGS) had higher protein contents than other locations. This indicates that the *Kulikuli* samples produced in the northern parts are of a higher nutritional quality and may have been from higher quality groundnut. On the other hand, it may be that the time of transportation of the snack produced in the North to the Western parts where they are sold may have contributed to the

deterioration of the samples from the South-western part (DS and HF) evidenced in the lower nutritional profiles in such samples. Since crude protein content was generally higher in all samples than all other nutrients, we may then support the fact that this snack is a very high source of protein according to Aletor and Ojelabi (2007).

The relationship between the contaminating microbes and the nutrients in the snack was inverse as seen from the high negative correlation values ( $> r = -0.37$ ). When considering the data, we suggest that the bacteria contaminants may have utilized more of the proteins and fat of this food material as their sole nitrogen and carbon sources since the correlation relationship was higher for bacterial load and the nutrient profiles ( $r = -0.70$ ) than the fungi ( $r = -0.37$ ). Therefore the bacteria contaminant played more role in the deterioration of the *Kulikuli* samples from all markets in Nigeria than the fungi, a data supported by the significantly ( $P < 0.05$ ) higher bacterial load than fungal amount in all samples from all locations.

Conclusively, we have for the first time reported an extensive data on the microbial quality of peanut cake and the implication of consuming such contaminated products on human health and safety. In this study we have related the relative microbial load to the present nutritional quality of the food materials available for consumption in the markets. To this we suggest the following measures for *Kulikuli* improvement in Nigeria and other *Kuli-kuli* consuming West African countries; sourcing of high quality peanuts for *Kulikuli* production; a high level of hygiene and sanitation during production, and packaging of this snack in *zip-lock* or sealed plastic bags. Since this snack may serve as supplement to low nitrogen foods such as cereal-based snacks and foods, and tubers it is advised that *Kulikuli* be consumed within 14 days of production to avoid the consumption of nutritionally deficient food.

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**References**

1. Adebesein AA, Saromi OT, Amusa NA, Fagade SO. Microbiological quality of some groundnut products hawked in Bauchi, a Nigerian City. *The Journal of Food Technology in Africa* 2001; 6(2): 53–55.
2. Adegoke GO. *Understanding Food Microbiology*. 2<sup>nd</sup> Ed. Alleluia, Ibadan. 2004; pp. 111–126.
3. Akano DA, Atanda O. The present level of aflatoxin in Nigerian groundnut cake ('kulikuli'). *Letters in Applied Microbiology* 1990; 10(4): 187–189.
4. Aletor O, Ojelabi A. Comparative evaluation of the nutritive and functional attributes of some traditional Nigerian snacks and oil seed cakes. *Pakistan Journal of Nutrition* 2007; 6(1): 99–103.
5. AOAC. *Official Methods of Analysis*. 15<sup>th</sup> Ed. Association of Official Analytical Chemists. Washington DC, USA. 1995.
6. Brown AE. *Benson's Microbiological Application*. 9<sup>th</sup> Ed. McGraw-Hill, NY. 2005; pp.249–279.
7. Collee JG, Fraser AG, Marmion BP, Simmons A. Mackie & Macartney *Practical Medical Microbiology*. 14<sup>th</sup> Ed. Churchill Livingstone, NY. 1997; pp. 430–433.
8. Cowan SR, Steel KJ. *Manual for Identification of Medical Bacteria*. 3<sup>rd</sup> Ed. Cambridge University Press, UK. 1993; pp. 140–143.
9. Delost MD. *Introduction to Diagnostic Microbiology*. 14<sup>th</sup> Ed. Mosby, St. Louis. 1997; pp. 205–380.
10. Ezekiel CN, Odebode AC, Fapohunda SO. Zearalenone production by naturally occurring *Fusarium* species on maize, wheat and soybeans from Nigeria. *Journal of Biological Environmental Science* 2008; 2(6): 77–82.
11. Finley BB, Falkow S. Virulence factors associated with *Salmonella* species. *Microbiological Sciences*. 1988; 5: 324–328.
12. Gachomo EW, Mutitu EW, Kotchoni OS. Diversity of fungal species associated with peanuts in storage and the levels of aflatoxins in infected samples. *International Journal of Agricultural Biology* 2004; 6(6): 955–959.
13. ISO Standard 7402. General guidance for the enumeration of enterobacteriaceae without ISO Standard 7402. General guidance for the enumeration of enterobacteriaceae without resuscitation – MPN technique and colony count technique. Geneva, Switzerland: International Organisation for Standardisation. 1993.

14. Jimoh KO, Kolapo AL. Mycoflora and aflatoxin production in market samples of some selected Nigerian foodstuffs. *Research Journal of Microbiology* 2008; 3: 169–174.
15. Lund BM, Baird-Parker TC, Gould GW. *The Microbiological Safety and Quality of Food*. Vol. 1. Springer. 2000; pp. 1285–1290.
16. Makun HA, Anjorin ST, Moronfoye B, Adejo FO, Afolabi OA, Fagbayibo G, Balogun BO, Surajudeen AA. Fungal and aflatoxin contamination of some human food commodities in Nigeria. *African Journal of Food Science* 2010; 4(4): 127–135.
17. Miki T, Okada N, Shimada Y, Danbara H. Characterization of *Salmonella* pathogenicity island 1 type III secretion-dependent hemolytic activity in *Salmonella enteric* serovar Typhimurium. *Microbial Pathogenesis* 2004; 37(2): 65–72.
18. Nielsen SS. *Introduction to the Chemical Analysis of Foods*. CBS, New Delhi. 2002; pp. 93–122.
19. Nowroozi J, Hakemi vala M. Plasmid profile, antibiotic resistance and phenotypic virulent strains of *S. flexneri*. *Iranian Journal of Public Health* 2006; 35(4): 43–48.
20. Nzeako BC, Okafor N, Azikiwe N. Prevalence of *Aeromonas hydrophila* in seasonal episodes of gastroenteritis in Nsukka, Nigeria. *Kuwait Medical Journal* 2002; 34(1): 16–19.
21. Oladimeji GR, Kolapo AL. Evaluation of proximate changes and microbiology of stored defatted residues of some selected Nigerian oil seeds. *African Journal of Agricultural Research* 2008; 3(2): 126–129.
22. Oscarsson J, Westermark M, Lofdahl S, Olsen B, Palmgren H, Mizunoe Y, Wai SN, Uhlin BE. Characterization of a pore-forming cytotoxin expressed by *Salmonella enterica* serovars Typhi and Paratyphi A. *Infection and Immunity* 2002; 70(10): 5759–5769.
23. Raper KB, Fennel DI. *The Genus Aspergillus*. Williams and Wilkins, Baltimore. 1965.
24. Samson RA, Hoekstra ES, Frisvad JS, Filtenborg O. *Introduction to Food-borne Fungi*. 4<sup>th</sup> Ed. CentraalBureau voor Schimmelcultures, The Netherlands. 1995a; pp. 3–165.
25. Samson RA, Hoekstra ES, Frisvad JS, Filtenborg O. *Methods for the detection and isolation of food-borne fungi*, 1995; pp. 235–242. In Samson RA, ES Hoekstra, JS Frisvad, O Filtenborg (Eds.), *Introduction to Food-borne Fungi*. 4<sup>th</sup> Ed. CentraalBureau voor Schimmelcultures, The Netherlands.
26. Sharma K, Rishi P, Grewal JS, Ram S, Tiwari RP. Correlation between congo red binding and contact haemolysin production in *Shigella* species. *Microbios*. 2001; 106(413): 31–38.
27. Talaro KP, Talaro A. *Foundations in Microbiology*. 4<sup>th</sup> Ed. The McGraw-Hill Companies, NY. 2002; pp. 398–400.
28. Watanabe H. Genetics of virulence *Shigella* species. *Microbiological Sciences* 1988; 5: 307–310.
29. Wilson T, Rabie CJ, Fincham JE, Steyn PS, Schipper MA. Toxicity of rhizonin A, isolated from *Rhizopus microspores*, in laboratory animals. *Food and Chemical Toxicology* 1984; 22(4): 275–281.

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