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NATIONAL AERONAUTICS and SPACE COUNCIL
WASHINGTON

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By ____ NARS, Date ____

July 18, 1963

MEMORANDUM FOR

Mr. Robert F. Packard
Office of International Scientific Affairs
Department of State
Washington 25, D.C.

SUBJECT: Thoughts on the Space Alien Race Question

During recent discussions the question has occasionally, though rarely, arisen that perhaps we should consider the policy question of what to do if an alien intelligence is discovered in space. Some discussion of this occurred, as you will recall, during deliberations on BNSP Task I. This memo contains some miscellaneous thoughts on the question.

The consensus of scientific view says, with quite good reasons, that the possibility of running across an alien intelligent race in our solar system is negligible. This is due primarily to the presumed unsuitability of conditions upon other planets to support life as we know it. The flying saucer advocates claim, of course, that the scientific viewpoint is nonsense, and that there is overwhelming evidence of such beings. In my own mind, I find it difficult to side with the flying saucer advocates, but the almost total impossibility envisioned by most scientists also is disturbing. Therefore, I present the problem in current perspective, as I see it.

Up until a few decades ago it seemed very improbable that intelligent life existed anywhere outside of the solar system. The chief reasons for this were a combination of scientific theory, scientific knowledge, and religious belief. The most widely accepted scientific theory as to the formation of the solar planetary system held that it was a result of the near collision of two stars. Since such a precise near-miss

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总统行政办公室
国家航空航天委员会
华盛顿

解密编号1
By ____ NARS, Date ____

1963年7月18日

致：

罗伯特·F·帕卡德先生

主题：关于太空外星种族问题的思考

在近期的讨论中，偶尔——尽管次数不多——有人提出，或许我们应当考虑一个政策问题：如果在太空中发现了外星智慧生命，我们该怎么办？各位应记得，在BNSP任务一的审议过程中，曾对此有过一些讨论。本备忘录收录了一些关于此问题的零散思考。

科学界的主流观点——且理由相当充分——认为，在我们的太阳系内遇到外星智慧文明的可能性微乎其微。这主要是因为我们所知的生命形式，在其他行星上可能因环境条件不适宜而无法生存。当然，飞碟爱好者们声称，科学界的看法纯属无稽之谈，并有大量证据表明此类生命确实存在。就我个人而言，我很难站在飞碟爱好者一边，但大多数科学家所设想的几乎完全不可能性，也令人不安。因此，我在此以当前视角呈现这一问题，正如我所理解的那样。

直到几十年前，太阳系之外存在智慧生命的可能性似乎还非常渺茫。这主要是因为科学理论、科学知识与宗教信仰三者共同作用的结果。关于太阳系行星系统形成的最广泛接受的理论认为，它是两颗恒星近乎相撞的结果。而这样一次精确的擦肩而过

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of two stars would be an extremely rare event, it followed that there would be very few other planetary systems in the universe and, indeed, perhaps this was the only one. Religious belief said, furthermore, that life was a gift bestowed by God. This was a relatively undisputed point since no scientific data existed to bridge the gap between non-living and living materials.

The situation today is vastly changed in these respects. The most widely held theory of stellar formation would predict the formation of planetary systems to be a natural consequence of stellar evolution. On this basis, most stars would possess planetary systems, and the number of habitable planets in our galaxy would be tremendous. Our biggest telescopes cannot resolve planets at the distances even of the nearest stars, so no direct confirmation is yet available. In my own mind, however, the wide prevalence of multiple stars is an overwhelming hint in support of this theory. In addition, the biological sciences have almost completely traced a series of natural occurrences which lead from inanimate molecules to elementary living viruses. Thus, we have the current scientific theory and data not only that there are a huge number of planets in the galaxy, but that life is quite likely to arise spontaneously on a large number of these. This, of course, does not necessarily imply intelligent life. Modern theology is not necessarily incompatible with this. The description in Genesis of the Creation certainly is a better picture of the current theory than of a stellar collision, and since God only spent seven days on this system, He has clearly had lots of time to create many more systems.

Even granting a probable existence of much life in the galaxy, there is still the question of whether another intelligent race exists in our solar system. There are, of course, two methods of its establishment in our system. One of these is that it originated on some other planet, for instance, Mars. Some of the spectacular markings of Mars have been interpreted as indicating intelligence. In particular, the famous "Canali" are rather narrow, and always run from one prominent marking to another, frequently with round splotches at intersections. As far as I know, no one has discovered a "Canali" which goes nowhere. This has quite understandably stimulated much conversation. In fact, a number of decades ago, when scientists thought that any life on other stellar systems was very remote, they seemed to feel that intelligent life

两颗恒星相撞将是一件极其罕见的事件，由此推论，宇宙中其他行星系统也会非常稀少，甚至可能只有这一个。宗教信仰进一步认为，生命是上帝赐予的礼物。这一点相对没有争议，因为当时还没有科学数据能够解释从无生命物质到有生命物质的跨越。

如今，情况在这些方面发生了巨大变化。最广为接受的恒星形成理论预测，行星系统的形成是恒星演化的自然结果。基于此，大多数恒星都会拥有行星系统，而我们银河系中适宜居住的行星数量将极为庞大。即使是最强大的望远镜也无法分辨出最近恒星距离上的行星，因此目前尚无直接证据。然而，在我看来，多星系统的广泛存在是一个强有力的暗示，支持这一理论。此外，生物科学几乎完全追溯了一系列自然过程，这些过程从无生命分子发展到原始生命病毒。因此，我们现有的科学理论和数据不仅表明银河系中有大量行星，而且生命很可能在其中的许多行星上自发产生。当然，这并不一定意味着智慧生命。现代神学未必与此相悖。《创世记》中对创世的描述，显然比恒星碰撞理论更符合当前的理论，而且既然上帝只花了七天时间创造这个系统，他显然有充足的时间创造更多系统。

即使承认银河系中可能存在大量生命，我们太阳系中是否存在另一个智慧种族仍是个问题。当然，它在我们系统中确立的方式有两种。一种是它起源于其他行星，比如火星。火星上一些引人注目的标记被解读为智慧的迹象。特别是著名的“运河”，它们相当狭窄，总是从一个显著标记延伸到另一个，交叉点常有圆形斑点。据我所知，还没有人发现一条“运河”是通向虚无的。这自然引发了大量讨论。事实上，几十年前，当科学家认为其他恒星系统上的生命非常遥远时，他们似乎觉得智慧生命

probably existed on our other planets. Some of the discussions about life on Mars at the turn of the century seem to indicate a strong urge to want to find intelligent life elsewhere. Today, the situation is completely reversed, and although intelligent life is considered quite probable among the stars, it is held to be quite unlikely within the solar system. We seem more eager to listen with Ozma than to look closely at Canali.

One school of flying saucer advocates claims that the Martians have been mining our moon for natural resources for some time. At first thought, one would think they would rather mine earth. It is interesting to speculate, however, upon space flight from the point of view of a Martian. The escape speed of Mars is only 16,500 fps, and, of course, braking speed on our moon is less than 10,000 fps. Thus, Martians looking at earth would tend to view it the same way Terrestrials look at Jupiter. Our moon might not be less work to get to, since atmospheric braking to earth is possible, but would be very much easier to return from, while the energy requirements to go to and return from the surface of the earth might well be so high as to discourage interest, at least initially. Interestingly enough, even a normal high energy chemical rocket could make a trip from Mars to our moon at favorable times while carrying almost 10% of its gross weight in payload. Space flight starting from Mars, then, is a much easier prospect than starting from Terra. If a suitable refueling base had been painfully established on our moon, the operation could be done quite commendably with merely chemical energy. (The aforementioned high energy chemical rocket could carry at favorable times almost 50% payload back to Mars.) Of course, many flying saucer advocates claim that the discovery of both Martian moons within a week in the latter part of the Nineteenth Century indicates that they are large artificial space stations, otherwise they would have been found earlier. If we were to discover Martians on the moon, it would result in surprisingly little readjustment of our scientific thinking. The biggest question would be why they were there rather than among the Asteroids.

In fact, if we were not as scientifically sure of ourselves as we are, three recent events would be hailed as broad hints of intelligent life on the moon. (1) The discovery of hot gasses eminating from the crater Alphonsus when the moon was supposedly dead. This would be considered evidence of civilization and, since Alphonsus is close to the visible edge, interpreted to mean that the other side of the moon was teaming with population which had begun

可能曾存在于我们的其他行星上。世纪之交关于火星生命的一些讨论，似乎显示出一种强烈的渴望，想要在其他地方找到智慧生命。如今，情况完全逆转了，虽然人们认为恒星之间很可能存在智慧生命，但在太阳系内却被认为极不可能。我们似乎更热衷于用奥兹玛计划去倾听，而不是仔细观察卡纳利运河。

飞碟鼓吹者中有一个学派声称，火星人已经开采月球自然资源一段时间了。乍一想，人们会认为他们宁愿开采地球。然而，从火星人的角度来思考太空飞行，倒是很有趣。火星的逃逸速度仅为每秒16,500英尺，当然，在月球上的制动速度低于每秒10,000英尺。因此，火星人看地球时，会倾向于像地球人看木星那样看待它。我们的月球可能并不更容易到达，因为地球的大气制动是可行的，但从月球返回却容易得多，而前往地球表面并返回所需的能量可能高到足以打消兴趣，至少最初如此。有趣的是，即使是普通的高能化学火箭，在有利时机也能从火星飞往月球，同时携带近10%总重的有效载荷。因此，从火星出发进行太空飞行，比从地球出发要容易得多。如果在月球上艰难地建立了一个合适的燃料补给基地，那么仅用化学能就能相当出色地完成这项任务。（前述的高能化学火箭在有利时机可携带近50%的有效载荷返回火星。）当然，许多飞碟鼓吹者声称，十九世纪后期在一周内发现火星两颗卫星，表明它们是巨大的人造空间站，否则它们早该被发现了。如果我们在月球上发现火星人，这对我们科学思维的调整会小得惊人。最大的问题将是，为什么他们在那里，而不是在小行星带。

事实上，如果我们不像现在这样对自己在科学上如此确信，那么最近的三起事件就会被当作月球上存在智慧生命的明显暗示。（1）在月球被认为已死亡的情况下，发现阿尔芬斯环形山喷出热气体。这会被视为文明的证据，而且由于阿尔芬斯靠近可见边缘，会被解读为月球的另一面人口稠密，已经开始……

to spill around to this side. (2) The infra-red scans which show hot spots. These would be interpreted as indications of cities or at least mining camps. (3) The fact that no lunar or planetary probe of significance has been successful, in spite of major efforts on the part of two very successful earth orbitfaring nations. It would be supposed that someone was denying us deep space. (The other-side-of-the-moon pictures from Lunik III show no details of consequence, and the same can be said of the data from Mariner II compared to what we had already known about Venus from earth-based measurements.) Should the Martians have colonized the moon without discovering nuclear energy, then they represent no real problem, and our current national policy would be made to order for the situation. If all of this were true, of course, I would expect the Martians to be scared to death of what they have seen recently on this planet, and would expect that the highest priority development program in the solar system is being conducted by the Atomic Energy Commission of Mars.

Even if we are secure in our belief that intelligent life never would develop on Mars or some other solar planet, there is still the question of visitors to the solar system from other stellar systems. This is normally written off as an extremely low probability, due to the tremendous distances between stars, and the Einstein limitation on travel faster than the speed of light. Therefore, even if there are a large number of intelligent life forms in the galaxy, and even if they are continuously searching for other races, the frequency of investigation of any stellar system would be only once in many thousand of years and contact would rarely, if ever, be achieved. It might never be achieved, since presumably intelligent races die out. (What happened to the planet whose pieces now are spread around the Asteroid Belt? Or, for that matter, why is Uranus lying on its side?) I am not sure that this travel restriction is quite as infallible as it sounds. I believe that it is possible with what we now know about nuclear energy to envision ships driven at half to three-quarters of the speed of light. This, since the galaxy is 100,000 light-years across, still does not make a search of the entire galaxy feasible within the life span of the average man. But suppose some race under pressure of population explosion were expanding as fast as technically feasible from star to star throughout the galaxy. If their ships averaged half the speed of light, and if, on the average, they stopped every 10 light-years for a twenty-year stay at a stellar system to deposit colonists, refuel, and build extra ships, they would only take two hundred thousand years, starting at the center of the galaxy, to spread

漏到这一侧。(2) 红外扫描显示的热点区域。这些会被解读为城市或至少是采矿营地的迹象。(3) 尽管两个非常成功的近地轨道国家付出了巨大努力，但没有任何一项重要的月球或行星探测器取得成功。这让人怀疑，是否有人在阻止我们进入深空。(月球三号拍摄的月球背面照片没有显示出任何有意义的细节，而水手二号的数据与我们从地球测量中已知的金星信息相比，也差不多如此。) 如果火星人殖民了月球却未发现核能，那么他们并不构成真正的威胁，我们当前的国家政策正好应对这种情况。当然，如果这一切都是真的，我预计火星人会对我们这个星球最近看到的一切感到极度恐惧，并且会认为太阳系中优先级最高的开发项目正由火星原子能委员会进行。

即使我们坚信火星或其他太阳系行星上永远不会发展出智慧生命，仍然存在来自其他恒星系统的访客问题。这通常被认为概率极低，因为恒星之间距离遥远，而且爱因斯坦理论限制了超光速旅行。因此，即使银河系中存在大量智慧生命形式，即使它们不断寻找其他种族，对任何恒星系统的探索频率也不过是几千年一次，接触几乎不可能实现。也许永远无法实现，因为智慧种族想必会灭绝。(那些如今散布在小行星带的碎片来自哪个行星？或者，为什么天王星是侧躺着的？) 我不确定这种旅行限制是否像听起来那样绝对可靠。我认为，根据我们现在对核能的了解，设计出以光速一半到四分之三速度飞行的飞船是可能的。然而，由于银河系直径达10万光年，这仍然无法让普通人在有生之年探索整个银河系。但假设某个种族在人口爆炸的压力下，以技术允许的最快速度从一颗恒星向另一颗恒星扩张，遍布整个银河系。如果它们的飞船平均速度为光速的一半，并且每飞行10光年就停留20年，在某个恒星系统上定居、补充燃料并建造更多飞船，那么从银河系中心出发，它们只需20万年就能扩散开来。

throughout the whole system. Since the earliest known remains of man have recently been dated at approximately one million seven-hundred thousand years, a sustained drive for merely two hundred thousand years may not be unreasonable. Of course, if we were to run across representatives of this kind of interstellar race, they would not be nearly as tame as the previously hypothesized chemical Martians, and our policy would need to be revised accordingly. Fortunately, travel time restrictions would inhibit their ability to bring all forces to bear, in case we should develop differences of viewpoint.

The third possibility, scientifically abhorrent, is that the Einstein theory may only be an approximation, and an alien race which actually travels faster than light exists. If we were to meet such a race, our policy had better be to negotiate fast, because the implications of their far better understanding and control of the fundamental forces of nature would be obvious. If all the scientific speculation were to turn out wrong and we were to stumble across an alien race, we would want to know as quickly as possible which of the three types I have indicated it was, as our diplomatic policy would damned well be influenced by the results.

CONCLUSIONS

Although all plausible scientific thinking suggests that we will not find any other intelligence race, the probability that we will is finite, and perhaps should not be completely ignored. Were we to find one, the question of whether it was a race with primitive chemical space flight, space flight equivalent to our best understanding of nuclear energy, or space flight based on physics beyond Einstein should be ascertained as rapidly as possible, since our policies would be affected in the most drastically possible way. In any event, a policy of the immediate burying of all Terrestrial hatchets would likely be in order. Even if we only found tame chemical Martians, or merely the debris from some intra-glactic survey mission, it would be a good idea to proceed on the assumption that the human race would finally have found a bigger problem than the ones it has created for itself. There likely is nothing to be done at

贯穿整个系统。由于已知最早的人类遗骸最近被测定为大约一百七十万年前，因此持续驱动仅二十万年或许并非不合理。当然，如果我们偶然遇到这类星际种族的代表，他们绝不会像先前假设的化学火星人那样温顺，我们的政策也需要相应调整。幸运的是，旅行时间的限制会抑制他们调动全部力量的能力，以防我们出现观点分歧。

第三种可能性，在科学上令人憎恶，即爱因斯坦理论可能只是一个近似，而存在一个实际以超光速旅行的外星种族。如果我们遇到这样的种族，我们的政策最好尽快谈判，因为他们对自然基本力量的理解和控制远超我们，其含义不言而喻。如果所有科学推测都错了，我们偶然发现了一个外星种族，我们就要尽快弄清楚它属于我指出的三种类型中的哪一种，因为我们的外交政策绝对会受到结果的影响。

结论

尽管所有合理的科学思考都表明我们不会找到其他智慧种族，但我们找到的概率是有限的，或许不应完全忽视。如果我们找到了一个，应该尽快确定它属于原始化学太空飞行的种族、与我们理解核能水平相当的太空飞行种族，还是基于超越爱因斯坦物理学的太空飞行种族，因为我们的政策将受到最剧烈的影响。无论如何，立即搁置地球上所有分歧的政策很可能是合适的。即使我们只找到了温顺的化学火星人，或者仅仅是某个星系内勘测任务的残骸，也最好假设人类终于找到了一个比它为自己制造的问题更重大的问题。很可能没有什么可做的了

the moment to prepare for these possibilities (the only body of writing on the subject available in an emergency is science fiction), because no one of consequence is going to take this rubbish seriously unless it happens. At that point, our policy will be determined in the traditional manner of grand panic.

Maxwell W. Hunter, II
Member, Professional Staff

为这些可能性做好准备的那一刻（紧急情况下唯一可用的相关文献是科幻小说），因为除非事情真的发生，否则没有任何重要人物会认真对待这些垃圾。到那时，我们的政策将以传统的大恐慌方式来决定。

麦克斯韦·W·亨特二世