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SPACE LAW AND METALAW—JURISDICTION DEFINED*

By ANDREW G. HALEY

General Counsel of the American Rocket Society, Chairman of the International Affairs Committee of the International Astronautical Federation.

In his excellent review of the papers delivered at the 7th Annual Congress of the International Astronautical Federation in Rome, Italy, September 17-22, 1956, Slater remarked with respect to my paper, Space Law and Metalaw—A Synoptic View, that I was deficient with regard to definitions. Having wholesome respect for Slater's power of analysis and criticism, I reread my paper with the thought that I might perform a useful task in clarifying the meaning of the terms I had used therein.

My reassessment of the Rome paper satisfied me that I had adequately defined anthropocentric law as being simply the law of human beings, and in this connection the term "law" is frequently employed as referring to a science of principles; and, specifically, a science or system of principles or rules of human conduct; "a system of rules and principles, in which the rights of parties are protected and enforced; a system of rules conformable to the standards of justice and on an enlarged view of the relations of persons and things as they practically exist; a mass of principles classified, reduced to order, and put in the shape of rules, agreed on by ascertaining the common consent of mankind; rules of civil conduct for the common good; rules promulgated by government as a means to an ordered society; the enforcement of justice among men." It is also said that the very definition of law is sancto sancti jubens honesta et prohibens contraria.

I also believe that terrestrial law, international law, natural law, and similar concepts of law have been discussed adequately.  

A meticulous review of the writings of experts in the field, as well as my own papers on the subject, left me with the belief that is it most

*Presented at the American Rocket Society Spring Meeting, Sheraton Park Hotel, Washington, D.C., April 3-6, 1957.


2 The author of this paper has made the following contributions on the subject: "International Cooperation in Rocketry and Astronautics." Published in Jet Propulsion, The Journal of the American Rocket Society, Volume 25, Issue No. 11, November 1955.


"Space Law and Metalaw—A Synoptic View." Presented at the 7th Annual Congress of the International Astronautical Federation, Rome, Italy, September
desirable to state as finally as possible a scientific definition of the precise area where the jurisdiction of terrestrial law ends and the jurisdiction of space laws begins.

To arrive at such a determination, it is desirable, and indeed necessary, to review the opinions of the authorities on the subject, and then come to some basic conclusions.

Because of the failure of publicists to furnish the Library of Congress with their writings—and the consequent lack of the indexing thereof in the United States—I undoubtedly have not consulted the writings of all the authorities who have dealt with space law. In the following brief review I have confined my observations to the works of John Cobb Cooper, Professor of Law and formerly Director of the Institute of International Air Law, McGill University, Montreal, and member, Advisory Council Woodrow Wilson School of Public and International Affairs of Princeton University. In my opinion, Dr. Cooper is one of the most competent world authorities and he is undoubtedly the Dean of American air law experts. Dr. Welf Heinrich Prince of Hanover has the unique distinction of being the first formal student of space law. As a graduate student at Goettingen, he had the imagination and courage to choose as his doctoral dissertation, "Air Law and Space," and his work has already earned the standing of a basic classic in the field of space law. Dr. Alex Meyer, of the University of Cologne, one of the world's foremost authorities on air law, read the first paper in Europe on space law at Stuttgart during the Third Congress of the International Astronautical Federation in September, 1952. Mr. C. Wilfred Jenks, of the International Labor Office in Geneva, has contributed one of the truly great discussions on the problems of space travel and space law and I have borrowed heavily from his article in my resume. Mr. Oscar Schachter, Director of the General Legal Division of the United Nations, has made several contributions in the field of space law, each of which is characterized by great clarity. Mr. P. K. Roy, Director of the Legal Bureau of the International Civil Aviation Organization (ICAO), whom we are privileged to have with us at this meeting, has shown acute awareness of the evolving problems concerned with space navigation and has kept ICAO alerted to these problems which has resulted in the recognition thereof at the Caracas Conference and on other occasions. I earnestly recommend that all students of the subject read Mr. Roy's paper read this morning, "Some Current Considerations Affecting the Evolution of Space..."
Dr. Ming-Min Peng, a Formosan scholar, has contributed thoughtful observations in the field.

"Certain jurists have insisted that the territory of a state is limited by the ability of that state to make its laws effective." Professor Cooper wrote in 1951, and he continued, "This is a harsh rule when applied to sovereignty in space. The richest and most powerful states now have means through high altitude rockets to control more or less effectively the ‘airspace’ over their surface territories. But the weaker states have no such power. Can we be said to live in such a world where the physical power at any one time of any particular state determines its international right to consider the region above its surface territories as part of its national territory? I may say here that my own belief is and has always been that if the rule of effectiveness is to be applied to determine the limit of state territory in space, then the rule should be that every state, no matter how small or how weak, as a state of equal sovereignty with every other state, has and should be admitted to have territorial rights upwards above its surface territories as high as the rights of every other state, no matter how powerful.

"Perhaps the rule should be, in the absence of international agreement, that the territory of every state extends upward as far into space as it is physically and scientifically possible for any one state to control the regions directly above it. In considering the possibility of adopting such a rule as this as part of international law, its limitation must be understood. The enormous distances must not be forgotten."

These observations of Professor Cooper have been misinterpreted on numerous occasions during the past several years. He continued, in the same article,

"... I am concerned that we must abandon the theory that the state has the right to claim territory out into space as far as the earth’s attraction extends, and that we must admit some such reasonable rules as I have suggested above—namely, that at any particular time the territory of each state extends upward into space as far as the scientific progress of any state in the international community permits such state to control space above it.

"Frankly, this is not put forward as a final solution. It is realized that it leaves open such vital questions as to what extent of control is contemplated, and by what means an international determination will be made of the ability of the most powerful state to extend its control into outer space. In its favor I can only say that it is worthy of consideration; that it provides the basis for a fairly livable world in which the weak state is not at the mercy of the strong."

On April 26, 1956, in an address before the American Society of International Law in Washington, D.C., Professor Cooper summarized his current thinking by proposing a three-zone concept of sovereignty.

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4 Idem.
created through an international convention on the subject. He suggests that we:

"Reaffirm Article I of the Chicago Convention, giving the subjacent state full sovereignty in the areas of atmospheric space above it, up to the height where 'aircraft' as now defined, may be operated, such areas to be designated 'territorial' space.

"Extend the sovereignty of the subjacent state upward to 300 miles above the earth's surface, designating this second area as 'contiguous space,' and provide for a right of transit through this zone for all non-military flight instrumentalities when ascending or descending.

"Accept the principle that all space above 'contiguous space' is free for the passage of all instrumentalities."\(^5\)

"I agree fully with Professor Cooper that the only way to solve the question concerning the legal status of the outer space is an international agreement and, in my opinion, the solution can only be to consider the outer space as a free area like the open sea," Dr. Meyer commented on the foregoing views of Professor Cooper. "In my opinion," Dr. Meyer continued, "it seems quite impossible to extend the states' sovereignty into the outer space. Besides the fact that the exercise of such sovereignty in the outer space cannot become effective, it seems impossible to fix an area in the outer space which corresponds to the territory of a state on the earth. The enormous distances between the surface of the earth and the outer space makes it impossible to state whether an event occurring in the outer space has occurred just above a certain state of the earth. Even by establishing fictitious borderlines above the territorial boundaries of a state, it seems impossible to fix an area in the outer space which corresponds exactly to these territorial boundaries.

"On the other hand, I have some doubt whether it would be necessary or even useful to establish a 'contiguous area,' evidently similar to the territorial waters of the earth. The situation of the air and the outer space is quite different from the situation on the earth. Between airspace and outer space no determined shore exists. The air has the particular quality of gradually becoming thinner and thinner. As soon as there is traffic into the outer space, it will of course be necessary to fix the limits between the airspace and the outer space in a certain altitude by an international agreement. At which height these boundaries should be fixed, will be a question to be decided by the experts.

"As concerns the additional questions of Professor Cooper whether ICAO should be authorized to amend its Annexes, so as to expand its definition of 'aircraft' to include instrumentalities which, like rockets and satellites, do not require support from the air, and thereby extend its regulatory jurisdiction to such new flight instrumentalities, I do not think it possible to include rockets and satellites which do not require support from the air within the term 'aircraft.' I think a differ-

ent term must be used for these instrumentalities. Mr. Cooper has already used the name 'spacecraft,' the name 'spaceship' has also been used. On the other hand, it would be possible to extend the regulations of the Convention of Chicago with the necessary amendments to the new flight instrumentalities.\(^6\)

A Formosan scholar, Dr. Ming-Min Peng, takes a contrasting position. He maintains that at least until interplanetary travel becomes a reality, the sovereignty of nations over the space above them should be considered to extend to the limits of all flight. He points out that the operative scope of the Chicago Convention of 1944, which embraced the national sovereignty principle, extends to the outermost part of the atmosphere and he justifies its use despite all practical difficulties on the ground of the immense danger to subjacent states which otherwise must exist.

Dr. Ming-Min Peng argues that nations have always considered themselves supreme in the whole area above their territory and that the sovereignty statements in the Conventions of this century were never considered by the contracting parties to be limitative in nature, but went to the limits of space thought to be usable by man.\(^7\)

Mr. Jenks takes the position that the national sovereignty concept cannot be applied beyond the Earth's atmosphere because the realities of interstellar space make such a concept "a meaningless and dangerous abstraction." He argues that space beyond the Earth's atmosphere is analogous to the high seas and is and must remain incapable of appropriation by the projection into it of any particular sovereignty based on a fraction of the Earth's surface. He cites the satellite launching plan as an example of the acceptance of his thesis on state practice.\(^8\)

Jenks states:

"... that the present law relating to sovereignty over air space... may be regarded by future generations much as we regard the claims to maritime sovereignty which were more or less successfully asserted for several hundreds of years before Grotius and Bynkershoek established the principle of the freedom of the seas. Space beyond the atmosphere of the earth presents a much closer analogy to the high seas than to the air space above the territory of a state. One could, theoretically, conceive of the atmosphere, the ionosphere, the zone used by earth satellites and interplanetary and interstellar space beyond as a series of zones subject to differing legal regimes. There would, however, be serious difficulty in defining the boundaries of the successive zones. Even if this difficulty were overcome and such an approach to the problem were to be adopted the projection of the


\(^8\) C. Wilfred Jenks, "International Law and Activities in Space," 5 Int. and Comp. L. Q. 99 (1956).
territorial sovereignty of a state beyond the atmosphere above its territory would be so wholly out of relation to the scale of the universe as to be ridiculous; it would be rather like the Island of St. Helena claiming jurisdiction over the Atlantic.

"... any projection of territorial sovereignty into space beyond the atmosphere would be inconsistent with the basic astronomical facts. The revolution of the earth on its own axis, its rotation around the sun, and the planets through the galaxy all require that the relationship of particular sovereignties on the surface of the earth to space beyond the atmosphere is never constant for the smallest conceivable fraction of time. Such a projection into space of sovereignties based on particular areas of the earth's surface would give us a series of adjacent irregularly shaped cones with a constantly changing content . . . missiles, space stations and space ships moving in space would be constantly changing their position in relation to the subjacent territorial sovereignties at such high speeds that whatever relationship of control might subsist between earth stations and such objects in space would have no territorial aspect analogous to the control exerted by a state in its air space or territorial waters. Only activities within the atmosphere of the earth would appear to be susceptible of a degree of control similar in general nature to that which can be exercised in territorial waters or over a wider maritime frontier belt. By reason of the basic astronomical facts, space beyond the atmosphere of the earth is and must always be a res extra commercium incapable of appropriation by the projection into such space of any particular sovereignty based on a fraction of the earth's surface."

Summing up his position, Jenks says:

"1. Space beyond the atmosphere is a res extra commercium incapable by its nature of appropriation on behalf of any particular sovereignty.

"2. It is most desirable that jurisdiction over activities in space beyond the atmosphere should be recognized to be vested in the United Nations and that legislative authority over activities beyond the atmosphere of the earth should be exercised by the General Assembly acting through or on the advice of an appropriately constituted body. If the political difficulties can be overcome, such an international solution of the problem of jurisdiction in space presents no insuperable legal difficulties.

"3. Failing such an international solution of the problem of jurisdiction in space beyond the atmosphere, it will be necessary to determine such jurisdiction on the basis of appropriate criteria inspired by analogies drawn from maritime and aviation law and to develop common international rules and standards governing the wide range of problems which would arise.

"4. Rules governing the extent to which, and manner in which,

\[\text{Jenks, Id. at 103-104.}\]
national authorities may protect themselves against interference from space beyond the atmosphere with matters within their territorial jurisdiction or interfere, by electronic or other means, with activities in space for the purpose of making such protection effective, or for other reasons, will be necessary."

Mr. Oscar Schachter: ". . . It is obviously of some importance to the future of space travel to know precisely what is meant by the term 'airspace' as used in international law. Does the term 'air' extend only to the upper atmospheric regions? Should it be defined in terms of the composition and/or density of the gases? So far there has been no authoritative answer to this question. The reasonable answer, it would seem, is to consider that the term is used in aviation treaties and therefore it is presumably intended to refer to the part of the atmosphere which contains enough air to allow aircraft (including balloons) to fly. Up to now balloons have gone as high as 21 miles, but it is estimated that air sufficient for flight extends about twice as high above the earth. Beyond that there is no airspace so far as aircraft are concerned.

"Whatever may be the precise boundary of the airspace, it is clear that when we go beyond it we are legally in a no-man's world. Before rocket ships were conceived of, some jurists maintained that there could be no upper limits to the territory of a state. A legal argument put forward for this was that 'in the air, the higher one ascends, the more damage a fall of objects will cause on the earth.' Consequently, since a country has the right to protect itself, it should have the right to control, as its territory, those areas above it which, if used by others, could involve damage to the country below. On this theory, the territory of a country would presumably extend upward as high as the earth exercises gravity over an object shot off into space — that is, as far as the farthest point from which a rocket would fall back on the earth.

"Although this approach might have seemed plausible to international lawyers years ago, it can hardly be justified when we consider its possible application. In the first place, the effect of the gravitational pull of the earth on an object varies with the shape of the object and the speed with which it moves. Obviously, therefore, it would be impossible to fix boundaries on the assumption that objects within these boundaries would fall back on the earth. Even if it were decided to establish an arbitrary limit (which would be related to the pull of gravity exerted on a rocket ship moving at a given speed), there would be great practical difficulties. For example, a rocket ship moving at, say, 25,000 miles per hour would not remain long over the territory of the country from which it started. It would pass through several countries — providing we extended their territories upward considerably beyond the 'air-space,' but it would be extremely difficult — in-

\[10\] Jenks, Id. 113-114.
"Indeed, practically impossible—for those in the rocket ship to know when it left one country and entered another.

"Similarly, the space station, held in its orbit by the force of gravity and moving 1,075 miles above the rotating earth at 15,840 miles per hour, would be passing over national territories, but it would be quite impossible to ascertain in practice when it crossed the theoretical boundary lines.

"Thus, the whole idea of determining the height of national territory in terms of gravity is not only unsound scientifically, but quite useless from the standpoint of legal rules.

"It has been proposed that the upper territory be limited in terms of a nation's power to exercise effective control. Presumably, this means that if a state can 'control' (that is, stop) the flight of another state's rocket ship or guided missile at a certain distance, then territorial sovereignty should be limited to that distance. This position has been put forward by a distinguished authority, John C. Cooper, the director of the Institute of International Air Law. He has proposed 'that at any particular time, the territory of each state extends upward into space as far as the then scientific progress of any state in the international community permits such state to control space above it.'

"It is interesting to note the resemblance between this approach and the old 3-mile rule which has fixed the area of a country out into the ocean. This 3-mile rule was also based on the idea of effective control—in particular, on the range of shore-based artillery batteries. At the end of the eighteenth century, these batteries had a range of about 3 miles, and therefore it was considered that that portion of the sea was within the control of the state.

"Although the principle of effective control has been important in international law, one wonders whether it should be applied to this new problem of space travel. It would seem to mean that whenever a country could prevent or interfere with the movement of a rocket ship or space station it would have the legal right to do so. Would this not, in effect, simply be a rule that 'might makes right'? And would it not place rocket ships and space stations at the mercy of those national states which were able to interfere with their free passage?

"There certainly does not appear to be any compelling reason in law or principle to carry national sovereignty this far. Indeed, any attempt to extend national territory higher than the airspace is bound to involve difficulties. Why not, then, fix the limit at the upper boundary of the airspace and no higher?

"Beyond the airspace, as already noted, we would apply a system similar to that followed on the high seas; outer space and the celestial bodies would be the common property of all mankind, over which no nation would be permitted to exercise domination. A legal order would be developed on the principle of free and equal use, with the object of furthering scientific research and investigation. It seems to
me that a development of this kind would dramatically emphasize the common heritage of humanity and would serve, perhaps significantly, to strengthen the sense of international community which is so vital to the development of a peaceful and secure world order."  

Mr. Schachter states his ideas in similar language, saying:

"Before considering the space beyond the airspace, it might be noted that the airspace itself has not been precisely defined. Does it extend to the upper atmospheric regions; and if so, are its limits to be defined in terms of the composition of the gases or the density? The most reasonable rule would seem to be one that defines the airspace in terms of the atmospheric elements necessary to 'lift' aircraft; a limit expressed in these terms would be in keeping with the purpose and intent of the treaties relating to aviation, which have thus far defined the upper limits of state sovereignty.

"When we go beyond the airspace we are legally in a no-man's world. Theories have, however, been suggested to extend state sovereignty above and beyond airspace. One view suggested by a distinguished authority is that the 'territory of each state should extend upward into space as far as the then scientific progress of any state permits such state to control space above.' (John C. Cooper, International Law Quarterly, July, 1951, p. 418.) It is difficult, however, to envisage how this principle of effective control can be applied in the regions above the airspace. Perhaps it means the space in which a national state can control (i.e., prevent) the passage of a rocket spaceship. But would not that mean that whenever any state could interfere with the movement of a spaceship, it would be considered to have the right to do so. Is this not in effect a rule that might makes right? Would it not place spaceships at the mercy of those national states which are able to interfere with their free passage? There does not appear to be any compelling reason in law or practice to carry state sovereignty this far. It is sufficient to limit the outer boundary of a state's territory as presently under international law, to the region known as the airspace and not beyond.

"If we exclude state sovereignty in the outer space what rules will apply? This does not seem to be an insuperable problem. We have an apt analogy in existing international law, viz., the regime of the high seas. The outer space, like the open sea, is not and should not be under the sovereignty of any national state whatever; in other words, no state can have the right to acquire this space any more than it has the right to acquire parts of the open sea. Nor similarly, should any state have the right to exercise jurisdiction or police parts of outer space.

"However, this does not mean that the outer space would be in a condition of lawlessness and anarchy. Like the high seas, it would be

governed by rules of international law which would provide for a degree of legal order and at the same time preserve the fundamental principle of its freedom."

Dr. Welf Heinrich Prince of Hanover discusses the problems of sovereignty and jurisdiction, "...one ought to examine whether the reasons arguing in favor of extending the sovereignty into the airspace above the national territories might safely be applied to the area beyond the atmosphere stretching above these national territories.

"This, however, would have to be answered in the negative... all those facts which make the close affinity of the airspace with the earth appear to accord with the laws of nature, in no way apply to the vacuum beyond the atmosphere, for only the air-filled regions are so automatically connected with life on the surface of the earth that they may be considered part of it. This 'correlation determined by considerations of space and sovereignty,' however, does not exist between the area beyond the atmosphere and the lands and waters underneath it. Thus, the area beyond the atmosphere cannot be considered an 'integral part' of any national territory... two conditions will have to be fulfilled for a nation to exercise its sovereignty over a certain area:

"There must be an area with frontiers which although invisible, will be capable of being determined. On the other hand there must be a possibility of exercising 'effective control.'

"Both conditions, however, do not apply in the case of regions beyond the atmosphere.

"Even when drawing imaginary frontiers above the boundaries of a country it will be quite impossible, within the limits of our present technical development, to ascertain whether some event has taken place above the territorial frontiers of a certain state.

"Such national frontier can no longer be determined with the kind of distances there are between the surface of the earth and the regions beyond the atmosphere.

"With the entire solar system perpetually in motion and the earth, involved in this process of perpetual motion, travelling along a fixed course while itself rotating, an extension of vertical frontiers from the earth into the area beyond the atmosphere would be out of the question.

"Admittedly, in order to exercise the sovereignty an actual occupation within the meaning of the law of things need not have taken place... nor will the authority of the state be required to show itself continuously. Equally, there is no fixed rule according to which a nation should meet immediately and directly on the spot every objectionable action directed against it from the territory in question.

"On the other hand there must be a possibility to exercise control.

"The fact that we are already in a position to have rockets penetrate for a short time into the area beyond the atmosphere, cannot be held to constitute a 'possibility to exercise control' over regions beyond the atmosphere.

"Thus, to extend the sovereignty of a ground state into the area beyond the atmosphere above its territory hardly seems to be a practical proposition, even if limits be determined for such regions.

"On all these grounds an extension of national sovereignty into the area beyond the atmosphere will be inadmissible, with the result that this area must be deemed free territory just like the airspace above the high seas and regions outside the jurisdiction of any state."

It will be noted from the foregoing review that the general idea of space law sovereignty and jurisdiction has finally become fairly well thought out.

After concluding the review, it seemed to me that the jurisdiction of space law might well be defined in scientific accuracy. At about this point in my quest, I received a telephone call from Dr. Theodore von Karman inviting me to spend the evening with him. He had just arrived in Washington from Paris.

By coincidence, this summons started a chain of memories. In the early 1940's I had the privilege of performing some small legal services for Dr. von Karman and for his sister, Dr. Josephine de Karman. And then I had the further privilege of constant association with the Karmans during the founding of Aerojet and the war-time management of that enterprise. Every now and then, during this harrassing period, a bright and cheerful event would occur, each of which is still hallowed in memory. One of these was in the autumn of 1942, when "the Boss," as I was privileged to call the good Doctor, advised me confidentially that the University of California at Los Angeles was to award him an honorary degree and, with his characteristic deference and kindliness, he asked whether I would like to attend the presentation. On this occasion, I drove from Pasadena to Westwood with "Pipo," the diminutive name by which Dr. Josephine de Karman was affectionately known to thousands of people throughout the world. On our way to Westwood, the thought suddenly occurred to me that "the Boss" had received so many honorary degrees no new ones were left to give and I pointed this out to Pipo. She obviously enjoyed the situation because she replied, "Ah, Mr. Advocate, wait and see." A short while later, at the general convocation, the Provost of the University of California at Los Angeles awarded the Boss with the degree of Doctor of Laws! On the way back to Pasadena, we had a great deal of fun speculating on the future career of Attorney von Karman.

So, a few weeks ago as I pondered on space law jurisdiction and my imminent visit with "the Boss," my mind went back fifteen years

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13 Dr. Welf Heinrich Prince of Hanover, "Air Law and Space," Thesis submitted to the Faculty of Law and Political Science at the Georg August University of Goettingen, 59-60 (1953).
to this incident and I decided, as of old, to discuss my problem with the good Doctor. As always, Dr. von Karman formulated a precise answer as to the jurisdiction of space law. During the evening he told me that he had delivered a paper last year at a luncheon at the University of California, Berkeley, entitled “Aerodynamic Heating—the Temperature Barrier in Aeronautics” and in that paper he had occasion to use a diagram made by Masson and Gazley of the Rand Corporation showing the possible ranges for continuous flight in the velocity-altitude coordinate system. Later on, he sent me a copy of his paper which contains the Masson and Gazley diagram. He said that his diagram, although designed to show the variation of velocity versus altitude for various values of dynamic pressure and equilibrium pressure, in the hands of a skilled person could readily be used to show the regimes of atmospheric and extra-atmospheric flight and to depict the jurisdictional boundary lines thereof.

Alas, as I do not have the skill, I have unskilfully redone the Masson and Gazley diagram [see Figure 1] to indicate curves showing the high altitude sounding rocket regime, the earth orbital satellite regime and the Kepler regime [earth escape velocity], and some supernumerary information.

To establish sound bases for demarcation of air and space jurisdiction it is necessary to consider that the conditions for accomplishing aerial flight, that is to circle at constant altitude, are weight equals aerodynamic lift plus centrifugal force. The aerodynamic lift decreases with altitude because of the decreasing density of the air and in order to maintain continued flight beyond zero air lift, centrifugal force must take over. Consider the flight of Captain Ivan C. Kincheloe, in which he took the X2 rocket plane to 126,000 feet altitude. His flight was strictly an aeronautical adventure and did not partake of space flight. At the altitude indicated aerodynamic lift carries 98% of the weight and only 2% is centrifugal force, or “Kepler force.” It will be noted that in the corridor of continuous flight when an object reaches approximately 275,000 feet and is traveling at 35,000 feet per second, the Kepler force takes over and aerodynamic lift is gone. This is a critical jurisdictional boundary.

I have reproduced the Masson and Gazley right side curve—the so-called temperature barrier, or heat barrier—simply to show the present state of the art, and thus arbitrarily to delimit the corridor of continuous flight. This line has nothing to do with the jurisdictional question as improved techniques in cooling and discovery of heat resisting materials will undoubtedly change this curve.

One scientific principle must be crystal-clear in the minds of the lawyer and the statesman, namely, the legal problems involved in space travel and exploration are unlike and are different in kind from those involved in maritime navigation and in air navigation, and only very limited analogies may be derived from the corpus of maritime and air law.
FIGURE 1
DIAGRAM SHOWING REGIMES OF ATMOSPHERIC AND EXTRA-ATMOSPHERIC FLIGHT AND DEPICTING THE JURISDICTIONAL BOUNDARY LINES
On a number of occasions, treaty makers and judicial bodies have had to face up to the solution of legal problems in connection with new developments in civilization. We will discuss this point very briefly and refer only to a few American authorities.

Justice Brandeis, in *Jaybird Mining Co. v. Weir*, stated that "It is a peculiar virtue of our system of law ... that an expression in an opinion yields later to the impacts of facts unseen."

Justice Cardozo, in *Paradoxes of Legal Science*, pointed out that "The impact may come from a new fact. It may come from a changing estimate of policy or justice ... what was ruled or next to ruled was well enough often according to the wisdom of its day. The light of a new day has set it forth as folly."

Justice Cardozo also said, "Stare decisis perpetuates error, prevents courts from adopting the law of the changed needs and desires to society, ... it is an abdication of reasoning power, judgment and responsibility of the present generation of lawyers."

Solomon Goldman quotes Justice Brandeis as saying, "In differentiation, not in uniformity lies the path of progress."

Chief Judge Loughran, of the Court of Appeals, state of New York, has pointed out that "I cannot go along with those who insist upon a rigid and mechanical adherence to the decisions of the past, without regard to the impact of later day social, economical and political changes that have been wrought in the world about us. Indeed if we were to be limited to slavish adherence to precedents and were not free to apply the decisions and their underlying principles to changing conditions and situations which did not exist and were not contemplated when the decisions were made, our decisional law would in great measure be no more advanced today than it was generations ago."

Judge Loughran also stated "... the danger is ever present that deference to the teachings of the past may lead us to approach current issues with minds attuned only to the spirit and attributes of a bygone day and may deprive us of the quality of being responsive to the needs and interests of the here and now."

Again, Justice Brandeis, in *Burnet v. Coronado Oil and Gas Co.*, wrote, "... Where correction through legislative action is practically impossible, this Court has often overruled its earlier decisions. The Court bows to the lessons of experience and the force of better reason-

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16 Decisions in The Court, ibid.
19 Ibid at 2.
20 285 U.S. 393, 407, 408; 76 L. ed. 815; 52 S. Ct. 443 (1932).
ing, recognizing that the process of trial and error so fruitful in the physical sciences is appropriate also to the judicial form.”

Justice Holmes summed up his viewpoints by stating, in The Path of the Law, that “... it is revolting to have no better reason for a rule of law than that it was laid down in the time of Henry IV.”

In a philosophical tenor, John Dewey wrote, “Here is where the great practical evil of the doctrine of immutable and necessary antecedent rules comes in. It sanctifies the old; adherence to it in practice constantly widens the gap between the current social conditions and the principles used by the courts... The sanctification of ready-made antecedent universal principles as methods of thinking is the chief obstacle of the kind of thinking which is the indispensable prerequisite of steady, secure and intelligent social reforms in general, and social advance by means of law in particular. If this be so, infiltration into law of a more experimental and inflexible logic is a social as well as an intellectual need.”

Justice Frankfurter, in Braniff Airways v. Nebraska Bd., stated that “One of the most treacherous tendencies in legal reasoning is the transfer of generalizations developed for one set of situations to seemingly analogous, yet essentially very different, situations.”

The folklore and the philosophy of the law were authoritatively and finally handled by the Supreme Court of the United States in Chicago & Southern Air Lines v. Waterman Steamship Corporation, in which the Court stated its determination that “The resemblance to water, rail and motor traffic must not blind us to the fact that legally, as well as literally, air commerce... has soared into a different realm than any that has gone before...”

The problems of maritime law and air law are susceptible of many common solutions arising from two basic affinities, namely (a) each medium is essentially terrestrial and is limited to terrestrial considerations, and (b) in each medium navigation is in a fluid ocean — air or water. The ability to fly or to float depends upon a terrestrial substance — and navigation does not depend upon centrifugal force or upon what we have called the Kepler Force.

No physical boundary could be more stark or real than the boundary shown in Figure 1 where the regime of aerodynamic lift ends and the regime of the Kepler Force takes over.

This complete mechanical dichotomy bequeaths to any animal conditioned to earth fundamentally new physiological and psychological problems, i.e., the problems of existence in the terrestrial media are fundamentally different from the problems of existence in free space. Once we are no longer earthbound we have entered into a new existence which must be governed by new sets of rules and regulations.

22 John Dewey, Logical Method and Law, 10 Cornell Law Quarterly 17, 26, 27 (1924).
23 347 U.S. 590, 603; 98 L. ed. 1015; 74 S. Ct. 826 (1953).
The legal problems which will arise in connection with space travel will be vastly more complicated and in many respects entirely different from those which faced civilization when it abandoned God's wind for the steamship and when it took to flight in the air.

As to man qua man, many of the common relationships established in the vast body of anthropocentric law will have to continue in space. Among these are the simple laws of Moses known to the Western World as The Ten Commandments. But many of our concepts of terrestrial municipal law and positive international law must be abandoned.

This conclusion seems to be well supported by the authorities whose writings I have reviewed above. It is quite interesting to note that Professor Cooper's second area of jurisdiction, which he calls "contiguous space," quite naturally flows from the curve on Figure 1 delimiting the boundary of the earth orbiting satellite regime. We thus find scientific basis for Professor Cooper's second zone and we also may find philosophical justification for his second zone as he states that we must "provide for a right of transit through this zone for all non-military flight instrumentalities when ascending or descending." Professor Cooper adds that "we must accept the principle that all space above 'contiguous space' is free for the passage of all instrumentalities."

I have studied with care both the papers of Professor Cooper and Dr. Meyer and, despite the scientific basis for Professor Cooper's second zone, at the present time I can think of no useful legal reason for the existence of such a zone as an area of legal regulation other than the obvious possibility of extending nationalistic territorial jurisdiction into this zone. The main purpose of this latter proposition would be to project into the second zone all the rules and regulations now part of municipal law and international law governing aeronautical navigation. As I am opposed to such an extension in principle, I must express my current caveat. I have lingering doubt as to the soundness of my position but I am sure that further thinking on the matter by all concerned will lead to clear solutions.

In his State of the Union Message to Congress on January 10, 1957, President Eisenhower said:

"A sound and safeguarded agreement for open skies, unarmed aerial sentinels, and reduced armament would provide its valuable contribution toward a durable peace in the years ahead. And we have been persistent in our efforts to reach such an agreement. We are willing to enter any reliable agreement which would reverse the trend toward ever more devastating nuclear weapons; reciprocally provide against the possibility of surprise attack; mutually control the outer space missile and satellite development; and make feasible a lower level of armaments and armed forces and an earlier burden of military expenditures. Our continuing negotiations in this field are a major part of our quest for a confident peace in this atomic age."
One week later, Henry Cabot Lodge, Jr., United States Representative to the General Assembly of the United Nations, outlined the proposed United States plan before the Political and Security Committee of the United Nations. He said, on January 14th:

"My statement today... will look more to the future than to the past... Only recently, in his letter to Marshal Bulganin of December 31, 1956 President Eisenhower affirmed his belief that 'deliberations within the framework of the United Nations seem most likely to produce a step forward in the highly complicated matter of disarmament.'

"President Eisenhower also declared the intention of the United States to submit new proposals in the United Nations."

Ambassador Lodge pointed out that the new proposals would center upon five points. One point, in his words, would be: "To insure that research and development activities concerning the propulsion of objects through outer space be devoted exclusively to scientific and peaceful purposes."

Elaborating on this point, Mr. Lodge stated: "Scientists in many nations are now proceeding with efforts to propel objects through outer space and to travel in the distant areas beyond the earth's atmospheric envelope. The scope of these experiments is variously indicated in the terms of 'earth satellites,' 'intercontinental missiles,' 'long-range unmanned weapons,' and 'space platforms.' No one can now predict with certainty what will develop from man's excursion in this new field. But it is clear that, if this advance into the unknown is to be a blessing rather than a curse, the efforts of all nations in this field need to be brought within the purview of a reliable armaments-control system. The United States proposes that the first step toward the objective of assuring that future developments in outer space would be devoted exclusively to peaceful and scientific purposes would be to bring the testing of such objects under international inspection and participation. The United States earth satellite presently planned for the International Geophysical Year is an example of an open project devoted exclusively to scientific purposes and developed with the knowledge and approbation of the scientists of the nations represented in the International Geophysical Year. In this matter, as in other matters, we are ready to participate in fair, balanced, reliable systems of control."

Great Britain immediately endorsed the United States plan. But Russia just as swiftly condemned it. Vassily V. Kuznetsov, Soviet foreign minister, argued that the United States had air bases sufficiently close to Russia so that long-range missiles would not be needed. Russia, on the other hand, has no such bases, Kuznetsov asserted, and must therefore depend on long-range missiles. Consequently, Russia will
demand that the United States give up NATO bases before Russia will agree to the control of long-range missile experimentation.

In spite of this Russian opposition, the General Assembly of the United Nations, on January 25, 1957, adopted a resolution recommending that the Disarmament Commission give "prompt attention" to the proposals, and further recommending that a report of progress be issued not later than August 1, 1957.29

While past experience has indicated that progress for such a proposal may be rather slow, there is satisfaction in knowing that this problem is, for the first time, being discussed by the United Nations. While initially, international control under such a proposal would extend only to international participation and inspection in testing of such objects, eventually the objects themselves would be subjected to international control and kept "peace loving."30

I deeply regret that the United States has handled this matter in the manner shown by the record. The IGY earth circling satellite program should never have been the subject of discussion in connection with the Disarmament Commission.

Our paper would not be complete without mention of the increasing awareness of the problems of extraterrestrial exploration by members of Congress. In January of this year, Representative Frank M. Karsten introduced a Bill in the House of Representatives to create a joint Congressional Committee on extraterrestrial exploration to make "continuing studies of activities and problems relating to the development of extraterrestrial exploration and travel."31

This Bill is similar to one introduced by Mr. Karsten in 1955.32 While the earlier Bill failed to receive the support that it merited, it is believed that the increasing awareness of the problems of space exploration over the past few years will assure Mr. Karsten's present Bill of a better reception.

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