SPACE VEHICLES, SATELLITES, AND THE LAW

James T. Lyon*

NOTE: *This article is intended to complement the "Historical Survey of International Air Law"** by giving an Introduction to the new field of Space Law, which is still in its earliest stages.*

Introduction

The scientific investigation of the realms of space in recent years has given rise to widespread legal speculation. Even before Sputnik 1 was launched in October, 1957, legal commentators foresaw some of the problems which would arise, and the events which have followed since then have emphasised both the importance of this field of activity, and the lack of laws which exist to govern it. It has been said that the learned discussions of the emergent law of outer space have been of necessity conducted in a vacuum of State practice and of publicly uttered official opinion.

The Law, like Nature, abhors a vacuum, and it is hoped that this article will review, in a brief compass, some of the problems which have been considered, and the solutions which have been offered.

Jurisdictional Boundary Between Air Law and Space Law

Wherever its final destination may lie, every aircraft and space-craft must first penetrate that belt of air which surrounds the earth, and which has been for many years the subject of an ever-increasing volume of national and international legislation. Before a proposed law of space may be considered, therefore, reference must be made to the pre-existing substantive law of the air. This is particularly important in the determination of the areas of application of the law of the air and the law of space.

The cardinal principle of air law, discussed before World War I, established by the Paris Convention of 1919, and confirmed by the Chicago Convention of 1944, is that every State has complete and exclusive sovereignty over the airspace above its territory[1]. Amongst the States which did not sign the Chicago Convention, the U.S.S.R. has adopted an identical rule by providing in Article 1

*Graduate student in the Institute of Air and Space Law, McGill University.

**(1960-61) 7 McGill Law Journal Nos. 1 and 2.

[1]Convention on International Civil Aviation, Chicago, 1944, Article 1. See also Sand, Freitas, and Pratt, *An Historical Survey of International Air Law Before the Second World War*, (1960-61) 7 McGill Law Journal, 24 *et seq.*

of its Air Code that "To the Union of S.S.R. belongs the complete and exclusive sovereignty over the airspace of the Union of S.S.R."[2] Some national legislations are founded on variations of this theme: the 1950 Constitution of Nicaragua includes as national territory the "atmospheric space' and the "stratosphere" above the nation, while the laws of Brazil refer simply to "space".[3]

The practical application of such statements is complicated by their vagueness. While it is relatively easy to establish the horizontal extent of the airspace in which sovereignty is claimed, it is impossible to determine the internationally recognised vertical limitations, if, indeed, such limitations exist. Whether due to one of the "prudent ambiguities of cautious statesmen" or to a dearth of technical foreknowledge, the drafters of the Chicago Convention have left the question open: the Convention offers no precise height limit for the exercise of State sovereignty.

This has led to one of the most vexed problems of the nascent law of space. If there be no vertical limit to the area in which State sovereignty is claimed, then this area will be projected into outer space, and will affect space itself, artificial satellites and other space-vehicles, and stellar bodies; if there be a vertical limit, it must be at some determinable height above the earth, so that it will be known when an object is subject to State law and when it is not. There has been great diversity of opinion as to what height limit, if any, should be accepted.

In 1906 it was possible for Westlake to state that no limit exists "for the sovereignty of the State above the airspace". "The right of the subjacent State remains the same whatever the distance."[4] In the light of present knowledge, however, it will be noted that the second part of the quotation exceeds the first. That is, a claim "whatever the distance" would involve such regions of space as are traversed by the Russian Venus rocket of February 1961, which are patently beyond the realms of airspace.

More recently it has been said that State sovereignty extends in practice into "all space which can be used by man",[5] and the term "airspace" in Article 1 of the Chicago Convention has been interpreted to mean "usable space" or "all space accessible to man"[6]. Some few writers have taken the position that the "Chicago Convention and domestic Constitutional or Statutory pronounce-

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[2]*Vide* Galina, A., *On the Question of Interplanetary Law*, Sovetskoe Gosudarstvo i Pravo No 7, July 1958, 52-58; reprinted in *Space Law: A Symposium*, Washington, D.C., 1959, 508. (hereinafter cited as Space Law).

[3]*Vide* Jessup, P. C., and Taubenfeld, H. J., *Controls for Outer Space*, New York, 1959, 336, Note 51.

[4]Westlake, cited by Cooper, J..C., *High Altitude Flight and National Sovereignty*, 4 International Law Quarterly, 1951, 412.

[5]Saint-Alary, R., *Le Droit Aérien*, Paris, 1955, 66; cited by Galina, A., *op. cit. Note* 2 *supra*, 509.

[6]Peng, Ming-Min, *Le vol à haute altitude et l'article* 1 *de la Convention de Chicago*, 1944, 12 Revue du Barreau de la Province de Québec, 1952, 292.

ments on sovereignty in space are automatically applicable to outer space".[7] Most of these statements were made before the launching of Sputnik 1.

If this position be accepted, it follows that sovereignty may be extended as far into space as human endeavour may reach, and that "all the rules of law, Conventional and National, relative to aerial navigation are applicable with full effect to all types of flight, at whatever height".[8] It would be difficult to apply this broad statement to actual cases. To illustrate the point, the Chicago Convention forbids the overflight of national territory by pilotless aircraft without special authorisation,[9] but no State has so far sought permission to launch artificial satellites which are pilotless, and which overfly foreign national territory.

Of recent years this position has been sharply criticised. In the U.S.S.R., the concept of national sovereignty in outer space has been dismissed as "unscientific geocentralism, a return from Copernicus to Ptolemy"[10], and it has been thought reasonable to recognise that no State has the right to submit parts of cosmic space to its own legislation, administration, and jurisdiction[11]. In the United States, one commentator writes that "we must agree that there is an upper boundary in space to the territory of the subjacent State"[12], and another has referred to the "absurdity of claims to sovereignty in outer space"[13]. In the United Kingdom it has been opined that the projection of the territorial sovereignty of a State beyond the atmosphere above its territory would be so completely "out of relation to the scale of the Universe as to be wholly ridiculous"[14], and indeed it is difficult to find a valid objection to this body of opinion. In view of the infinite distances of space, it may not be *mal à propos* to classify claims to an indefinite vertical projection of sovereignty with a possible claim by the Musicians' Union to Royalties on the Music of the Spheres.

Various bases have been offered for the determination of the upper limit of State sovereignty, and so for the lower limit of outer space. These are, principally, "airspace" in the sense of "atmospheric space"; physical boundaries

[7]Danier, E., and Saporta, M., *Les Satellites Artificiels*, 18 Revue Générale de l'Air, 1955, 297; Sulzberger, *Air Space—A Need for Definition is Seen, but an Ancient Roman Law Maxim goes Begging*, New York Times, 24th Feb., 1958, cited by McDougal, M. S., and Lipson, L., *Perspectives for a Law of Space*, 52 American Journal of International Law, 1958, 422.

[8]Peng, Ming-Min, *op. cit. Note* 6 *supra*, 292.

[9]Article 8.

[10]Korovin, *International Status of Cosmic Space*, International Affairs, 53-59 (Moscow), No. 1 (Jan. 1959); cited by Jessup and Taubenfeld, *op. cit. Note* 4 *supra*, 220.

[11]Galina, A., *op. cit. Note* 2 *supra*, 514.

[12]Cooper, J. C., *op. cit. Note* 4 *supra*, 417.

[13]Lissitzyn, O. J., *The American Position on Outer Space and Antarctica*, 53 American Journal of International Law, 1959, 129.

[14]Jenks, C. W., *International Law and Activities in Space*, 5 International and Comparative Law Quarterly, 1956, 103.

created by the natural laws of gravity and centrifugal force; and a miscellany of others.

Even when it is accepted that the Conventional and National legislations refer to "atmospheric space" when they speak of "airspace", there is still much room for debate. If the upper boundary of a State's territory were limited to the area used by airborne craft, "this would not depart from the meaning of airspace"[15] as understood in civil aviation treaties. Professor Cooper at one time maintained the same view by examining together Article 1 of the Chicago Convention and Annex 6 which defines aircraft. He suggested[16] that a new Convention should be created, reaffirming the present Article 1 of the Chicago Convention, but limiting it vertically to the height to which aircraft as defined in the Chicago Annex can operate, *i.e.* to some thirty miles. He then refined the suggestion by proposing that above that altitude there should still be a "contiguous zone" of sovereignty, through which there would be a right of transit for "all non-military flight instrumentalities when ascending or descending". Above that there was to be freedom from sovereignty.[17] Suggestions of this "atmospheric" nature have received wide support[18].

This support has not, however, been universal. Dr. Goedhuis, notably, found this old theory of Professor Cooper insufficient to meet the circumstances. He says[19] that according to this opinion the airspace above, say, twenty miles is not airspace in the sense of Article 1 of the Chicago Convention. "This opinion is based on a pretended connection in the two Conventions[20] on international civil aviation between the provision regarding sovereignty over airspace and the terms in which aircraft in the meaning of these Conventions are defined."

He disagrees that such a connection exists. Article 1 of the Chicago Convention acknowledges a general principle of law, which exists irrespective of the Conventions, but the provisions defining aircraft are of no more than a technical nature, not binding upon States which are not parties [21] to the Convention. Dr. Goedhuis was unable to find any evidence in the proceedings leading to the Paris and Chicago Conventions from which to conclude that the States were convinced that there was no need for them to exercise sovereign

[15]Schachter, O., *Proceedings*, American Society of International Law, 1956, 105.

[16]Cooper, J. C., *Legal Problems of Upper Space*, 23 Journal of Air Law and Commerce, 1956, 311 *et seq.*

[17]The "contiguous zone" was amended to extend to 600 miles of altitude by a letter to The Times, London, Sept. 2nd, 1957. Until then it was to be set at 300 miles.

[18]Pépin, Cheng, Ward, Roy, cited by McDougal and Lipson, *op. cit. Note 7 supra*, 422; Jenks, Zadorozhnyi, cited by Beresford, S. M., *Surveillance Aircraft and Satellites*, 27 Journal of Air Law and Commerce, No. 2, 1960, 108.

[19]Goedhuis, D., *Rapporteur* on Air Sovereignty and the Legal Status of Outer Space, International Law Association, New York University Conference, 1958.

[20]Paris Convention, 1919; Chicago Convention, 1944.

[21]Nor, indeed, are they binding on States which are parties to the Convention, although no State has raised an objection to them.

rights above the space where aircraft in the meaning of the Conventions can operate. The Conventions govern some only of the acts carried out in airspace, while the general principle embraced in Article 1 involves other factors than international civil aviation. "It is for this reason that proposals which have been made . . . to limit air sovereignty above a certain altitude have never gained acceptance by the States." From this it is concluded that "the term airspace in Article 1 is in accord with its literal meaning". Since airspace is thus not omitted by the technical annexes of the Chicago Convention, the question arises as to where is the geophysical limit of the airspace. While noting that physicists have differed on this point, Dr. Goedhuis considers it not beyond the bounds of expectation that, aided by the information gleaned by the satellites, "a *communis opinio* on this point may be formed"[22].

This common opinion has, at the time of writing, proved elusive, and, pending its acceptance, quite diverse suggestions have been put forward. One would have the boundary at 100 km (60 miles)[23], and another at 1,000 km[24]. Commenting on this type of theory, Mr. Loftus Becker has quoted astronomical authority to the effect that the earth's atmosphere can be considered to extend to 10,000 miles above the surface of the earth, and so the sovereignty of the United States may rationally be held to extend to that height.[25]

Other facets of the problem present themselves, and attempts have been made to deal with them on a basis of natural laws. The State has a right to protect itself, and one potential danger is that of objects falling on and causing damage to persons and property on the State underneath. This gravitational aspect of the question demands that the State exercise sovereignty up to the height from which an object, if released, would not fall to the surface under the point of release.

This height is where the algebraic sum of the earth's and sun's gravitational pulls is zero[26]. This is the "old classic theory" of Westlake to which Professor Cooper refers when he cites a "well-known astronomer" who has put this limit at some 161,000 miles from the surface of the earth[27]. Kroell also put this "frontière céleste" at some forty earth radii (*i.e.* approximately 40 x 4,000 miles) from the surface[28]. Such a boundary, he says, would achieve a situation "nette et précise".

Dr. Meyer takes issue with this proposal, as it would in practice "never be realisable"[29]. One of the important qualities of a boundary is that it should be

[22]Goedhuis, D., *loc. cit. Note* 19 *supra*.

[23]Böhme, K.-H., *Lufthoheit und Weltraumflug*, 5 Zeitschrift für Luftrecht, 1956, 197.

[24]Danier, E., *Les Voyages Interplanétaires et le Droit*, 15 Revue Générale de l'Air, 1952, 423.

[25]Becker, L., *Major Aspects of the Problem of Outer Space*, Space Law, 367 *et seq*.

[26]Some writers have stated that the earth's gravitational pull ceases at this height. This fallacy was exposed by Roy, P. K., *Proceedings*, American Society of International Law, 1956, 95.

[27]Cooper, J. C., *op. cit. Note* 4 *supra*, 416.

[28]Kroell, J., *Eléments Créateurs d'un Droit Astronautique*, 16 Revue Générale de l'Air, 1953, 230.

[29]Meyer, A., 9 Zeitschrift für Luftrecht, 1960, 310.

possible for navigators to realise when it is being crossed, and if conflicts of opinion not infrequently arise between fishermen and Fishery Protection cruisers regarding the maritime three-mile limit, then it is difficult to see how this proposed boundary at one hundred and sixty-odd thousands miles could be very precise.

Another view depends on the laws of the centrifugal force imparted to a missile or satellite. It is possible to measure the height at which vehicles are no longer capable of supporting themselves by aerodynamic lift, and rely for flight on centrifugal force. To maintain level flight, weight must equal aerodynamic lift plus centrifugal force. The forces equalling weight in, for example, the flight to 126,000 feet of the United States' Bell X-2 aircraft were aerodynamic lift 98%, centrifugal force 2%[30]. The aerodynamic component reduces with the reducing density of the air as height is gained. To maintain the equation when the aerodynamic component has disappeared, a body at about 275,000 feet would have to gain centrifugal force by moving at a speed of 35,000 feet per second. This is what happens in the case of artificial satellites.

Professor Cooper has noted that the United Nations' *Ad Hoc* Committee on the Peaceful Uses of Outer Space, in its 1959 Report, indicates that the upper limit of airspace and the lower limit of outer space do not of necessity coincide. Cooper would place the lower boundary of outer space at the lowest height at which an artificial satellite may be put in orbit. In fixing the lower boundary there, it is contended that no decision is required as to whether or not the absolute airspace sovereignty of the subjacent State extends upwards to that line. "The boundary line here suggested would appear to be in the area 80 to 100 miles above the earth's surface"[31].

Dr. Meyer has observed that this proposal may lead to the situation where an area would be created which would, so far as putting satellites into orbit is concerned, be considered as outer space, but which would be lapping into the airspace. This view of the Committee is, he thinks, problematical, because a contiguous zone between airspace and outer space must be rejected, and on the other hand, it would not be possible for a part of the space above the earth to be at one time airspace and outer space, as might be the consequence of this proposal. Such a decision would "lead to the greatest legal confusions"[32].

Some have tried to escape, rather than solve, the question of an upper limit to State sovereignty by determining the law applicable to a flight according to the intentions of its directors, and not on the locus of the flight-path. The choice of which law would regulate the flight, air law or space law, would, from the moment of take-off, be determined by the final destination of the

[30]Haley, A. G., *Droit de l'Espace*, 20 Revue Générale de l'Air, 1957, 179; this view is shared by Heinrich, Welf, Prince of Hanover, *Problems in Establishing a Legal Boundary between Air Space and Space, Proceedings* of the First Colloquium on the Law of Outer Space, The Hague, 1958, 28 *et seq.*

[31]Cooper, J. C., *International Control of Outerspace*, 9 Zeitschrift für Luftrecht, 1960, 290.

[32]Meyer, A., *ibid.*, 300

vehicle itself[33]. A trip through the ionosphere or higher from Paris to New York would be a "voyage aérien", whereas a trip to some point beyond the earth would be a "voyage astronautique", and each would be governed by its appropriate "ensemble de règles juridiques"[34].

This proposal leads to a possible conflict with air law. It implies a freedom of astronautical navigation with, as a corollary, liberty of transit through the airspace to allow of access to and from the extra-terrestrial zone, just as maritime law allows ships of all nations to traverse territorial waters in reaching and leaving the high seas.[35]

It may be worth while to examine the problem from space downwards, so to speak, rather than from the earth upwards. There may be some profit in considering a downward extension of a freedom of outer space rather than an upward extension of State space. This would involve the abolition of claims to sovereignty over the airspace. While this would strike at the very foundation of the present Conventional agreements, it has some historical basis. It would be a return to Fauchille's position at the beginning of this century. It would, furthermore, be in accord with President Roosevelt's message to the Chicago Conference in 1944, "I hope you will not dally with the thought of creating great blocs of closed air, thereby tracing in the sky the conditions of future wars"[36].

More recently, the Chinese and Italian representatives at the United Nations' Security Council have remarked that, in view of the flights of man-made satellites, air sovereignty has become more or less a myth[37], and Jenks has suggested that "the present law relating to sovereignty over airspace . . . 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"[38]. Danier thinks that the extinction of rights of sovereignty beyond atmospheric space will limit the right of sovereignty over airspace, and that it will be for the greatest good in human relations[39]. President Eisenhower's "Open Skies" proposal at the Summit Conference of July 1955 would, had it been adopted, have been a first step in this direction.

Within limitations, some of which have been sketched above, it is generally agreed[40] that outer space is a different entity from airspace, and that somewhere

[33]Kroell, J., *op. cit. Note* 28 *supra*, 228.

[34]Homburg, R., *Droit Astronautique et Droit Aérien*, 21 Revue Générale de l'Air, 1958, 15, 16.

[35]Kroell, J., *op. cit. Note* 28 *supra*, 235.

[36]*Proceedings of the International Civil Aviation Conference*, Washington, D. C., Vol. 1, 43.

[37]Wright, Q., *Legal Aspects of the U-2 Incident*, 54 American Journal of International Law, No. 4 Oct. 1960, 842.

[38]Jenks, C. W., *op. cit. Note* 14 *supra*, 103.

[39]Danier, E., *op. cit. Note* 24, 424.

[40]*Pro*, Goedhuis, *Rapporteur*, I.L.A. New York University Report, 4; *contra*, White, Chief of Staff, U.S.A.F., *Air and Space are Indivisible*, Air Force Magazine, Mar. 1958, 41, cited by Jessup and Taubenfeld, *op. cit. Note* 3 *supra*, 209.

there lies a dividing line between the two. Most writers agree that "at some point there is a limit to the extension of terrestrial sovereignties, and that in due course practical international necessities will lead to its definition"[41]. Apart from this general agreement in the principle, there is the widest variation in the proposed application, and for every suggested legal opinion there appears to be some astronomical opinion to back it up.

Activities in Outer Space

Outer space is an area utilised by artificial satellites intended to advance scientific knowledge, by military missiles, and by interplanetary craft. These diverse types of vehicle provoke equally diverse problems.

No public objection has until now been made to the overflight of national territory by artificial satellites[42]. While some of the satellites launched into orbit have been intended to extend the range of telephonic and radio communications, others have been aimed at supplying weather reports and televised pictures of meteorological conditions in the areas surrounding the earth. The United States' TIROS satellite, though designed to gather information concerning cloud formations, does transmit features from the surface, and it is probable that the SAMOS satellite is much more powerful[43]. These powers of observation give to even the most innocent of meteorological satellites a quasi-military character, and there is little reason to suppose that all satellites of this type are intended to be innocent. The satellite TIROS "may be said to have opened the fateful era of surveillance from outer space"[44].

The U.S.S.R. has made no objection to the launching of any satellite, even of those which cross Soviet territory, and a United States' Deputy Secretary of Defense (Quarles) has stated that his country would have no basis for objection if the Soviet Union put into orbit in outer space a reconnaissance satellite capable of observing the United States[45].

This statement on behalf of the United States exceeds explicitly the position which is no more than implicit in the Soviet Union's silence. The U.S.S.R., in making no objections, may either have adopted a view similar to Quarles', or it may in fact have objections which have remained unvoiced for some good reason. This would be in line with the position taken with regard to the United States' overflights of Soviet territory by U-2 aircraft. Although these reconnaissance flights had been carried on since 1956, the first public notice of objection came with Mr. Khruschev's announcement of May 5th, 1960, that one of these aircraft had been brought down in Russia.

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[41]Jessup and Taubenfeld, *ibid.*

[42]Although on Oct. 18th, 1957, Moscow Radio reported that three Swedish newspapers had charged that artificial satellites violated air sovereignty; *vide* Space Law, 506.

[43]"Time", Feb. 10th, 1961, 41.

[44]Beresford, S. M., *op. cit. Note* 18, 107.

[45]*Ibid.*, Note 25.

If the Soviet view be in fact in accord with that put forward for the United States, then both of these States appear to have taken up an anomalous position. While they object effectively to reconnaissance overflights by aircraft in air-space, they do not object to what may well become equally efficient overflights by space-craft in outer space. If it were possible to place a 40-inch telescope in a satellite at 500 miles altitude, it would be able, on a clear day, to detect and photograph objects on earth having a diameter of two feet[46]. This apparent self-contradiction in the national positions may be no more than a result of the uncertainty with which States regard their rights in space, or it may well be a recognition of their inability to prevent such surveillance from outer space. If the latter alternative be the correct one, then this would tend to prove that there is an upper boundary to State sovereignty in fact as well as in theory, since sovereignty may not be claimed where it is impossible to exercise it.

Military missiles have introduced some of the acrimonies of terrestrial politics to the realms of space. In 1958 the U.S.S.R. proposed to the United Nations that outer space should not be used for military purposes, and that the rockets sent into space should be in relation to an international programme. With this was coupled a proposal that foreign military bases in the territory of States should be liquidated. The obligations so created would have had to be accepted simultaneously. This would have destroyed the fabric of N.A.T.O. and so of the groundwork of Western defensive strategy. The United States wished to see the questions separated, thus expressing an opinion in diametric opposition to that of the U.S.S.R.[47]

Rockets have been placed in solar orbit and successfully directed to the moon, but man has not yet, unless unreportedly, ventured into space. The time cannot be far distant, nevertheless, when efforts will be made to launch a manned satellite. During 1960 the United States alone budgeted $70 million for manned spaceflight investigations[48], and it is scarcely likely that the U.S.S.R. will lag far behind.

When once a manned spaceflight has been accomplished, it will, we may suppose, be but a matter of time until men are placed on other planets, and this achievement will lead to problems of jurisdiction and sovereignty which may dwarf in seriousness the present problems of an upper limit to the area in which national sovereignty may be claimed. These jurisdictional problems will be transferred to the areas through which the men will travel, and on which they will alight.

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[46]"Time", Feb. 10th, 1961, 41.

[47]Galina, A., *For Equal Collaboration in the Peaceful Use of Cosmic Space*, Izvestia, Sept. 17th, 1958, 5; Space Law, 515.

[48]*Spaceflight*, British Interplanetary Society, Oct. 1960, 242.

Legal Status of Outer Space

First among the problems encountered in space will be the legal status of space itself. Two suggestions have been popularly supported by learned writers. One is that space will be *res omnium communis*[49], on the analogy of the high seas. There will be freedom of transit through it, and, being *extra commercium*, it will be incapable of appropriation. The other is that space will be *res nullius*[50], capable of appropriation; this may be distinguished from the types of claim, considered above, whose foundation is a vertical projection of State sovereignty. In the present case the claim would be based on the presence in space of the property and agents of some terrestrial State.

Amongst those writers who hold that space is *res omnium communis*, it appears to be thought sometimes that it is in some way wrong for a State to claim sovereignty over space, and that therefore space is a common good, "le patrimoine commun de l'Humanité"[51].

It is rather difficult to see why this should be so. On the grounds of practicability, if it be impossible for one powerful State to extend its sovereignty into space, it would seem equally impossible for a consortium of two or ten to do so. Where distances are measured in terms of light years rather than of length, the relative strengths of one nation or many seem much the same.

If such grounds be ignored, the proposed title of the United Nations to outer space must be based on some inherent moral right. This right is, presumably, the premise on which argument is founded, but it should be tested before it is used. It has been postulated that life exists beyond our planet[52], and it has certainly not been proved that intelligent life does not exist. It may therefore be somewhat ambitious to assert that space is the patrimony of Humanity. At the very least, such a claim by puny man lacks humility.

This is not to say that the control of human activities in space should not be "regarded as a world responsibility"[53], although there may be grounds for objecting to this also at the present time (*vide infra*). A claim to control the activities of man in space falls far short of a claim to rights of property over space.

While the proponents of the *res omnium communis* view approximate liberty of passage in space to the freedom of movement on the high seas, this is not done without reservation. Questions of defence arise, together with rights of self-protection in international law.

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[49]International Law Association, Hamburg, 1960, 9 Zeitschrift für Luftrecht, 1960; Meyer, A., *ibid.*, 311; Cooper, J. C., *ibid.*, 292; Kroell, J., *op. cit. Note* 28 *supra*; Galina, Zadorozhnyi, Neumann, cited by Jessup and Taubenfeld, *op. cit. Note* 3 *supra*, 219, Note 94.

[50]For discussion *vide* Jessup and Taubenfeld, *ibid.*, 209 *et seq.*

[51]Kroell, J., *op. cit.*, *Note* 28 *supra*, 233.

[52]Haley, A. G., *Space Law and Metalaw: A Synoptic View*, Space Law, 150 *et seq.*

Professor Lissitzyn, in his penetrating analysis[54] of some statements by Mr. Loftus Becker of the United States' Department of State, detects the implication that space is *res nullius*, over which certain acts followed by certain claims may establish national sovereignty. Becker claimed that the United States had engaged in certain activities in outer space which gave to it certain rights as distinguished from States which had not so acted, although the United States had made no actual claims, based on these activities, to sovereignty. This was not to be interpreted, however, as conceding that the United States did not have the rights which would found such a claim.

Here Lissitzyn discovers an inconsistency between Becker's suggested extension, by vertical projection in the airspace, of national sovereignty to an altitude of 10,000 miles (*vide supra*), and the claim that the activities mentioned might found a claim to sovereignty in outer space, when in fact there was no information to suggest that the United States' activities had been carried out above 10,000 miles. That is, if the activities below 10,000 miles gave rights in outer space, then the claim that national airspace extends to that height must fall.

In any case, he asks, what extent of space can be claimed, and where would lie its boundary with such space as the U.S.S.R. might claim on the basis of similar activities? Kroell holds that any occupation of outer space by a satellite can have none but a precarious and transient character[55]. The basis of occupation is effective control, and "there is no assurance that anything comparable to 'effective control' over a part of terrestrial space can be established in outer space"[56].

It may be argued, then, in favour of the *res omnium communis* view that although space does not automatically have the same nature as the high seas, it will in the end, from purely practical causes, be held in a similar regard. Freedom of navigation on the high seas is the result not of some kind of international morality, but of the practical impossibility of keeping the seas private, or subject to a national jurisdiction. Quite apart from any assumed rights or wrongs, the same considerations may very well lead to the same condition in outer space.

Legal Status of Satellites

Concerning the status of artificial satellites and space-craft themselves, it has been suggested that the solution will be found with reference to the status given to the space in which they are moving.[57] In space considered to be beyond any sovereignty, the satellite may be regarded by the launching State

[53]Jenks, C. W., *op. cit. Note* 14 *supra*, 107, 108.

[54]Lissitzyn, O. J., *op. cit. Note* 13 *supra*, 129.

[55]Kroell, J., *op. cit. Note* 28 *supra*, 234.

[56]Lissitzyn, O. J., *op. cit. Note* 13 *supra*, 131.

[57]Danier, E., and Saporta, M., *op. cit. Note* 7 *supra*, 302.

as a detached part of its national territory, subject to national law, whether it be governable or not, manned or unmanned.

This opinion is extended by Galina[58], who thinks that even if these devices fall to earth outside the territory of the State which launched them, they remain the property of the State, and should be returned to it. Such a claim would have a close relationship with damage on the surface caused by the falling satellite. It may be doubted if an early definition of the legal status of satellites and space-craft will be reached: the legal status of an aircraft has still, after some sixty years of flight, to be accurately defined.

Legal Status of Stellar Bodies

The proposed legal status of the moon and other stellar bodies is, like space itself, either *res omnium communis* or *res nullius*.

The first of these has been supported by, amongst other authorities, Dr. Meyer[59], and by the spokesmen for various small nations. These latter have termed the appropriation of space or the heavenly bodies impossible, or at least "highly improper"[60]. "The largest group" (of writers) "insists that space and the heavenly bodies are not subject to appropriation or control by individual national groups, but argues that this *res extra commercium* must be subject to some international control to prevent misuse of the areas in question and danger and damage to other persons or nations"[61].

On the other hand, while it is allowed that a United Nations' jurisdiction over the moon and other planets would avoid rival appropriations of territory there, it has been thought that, failing such jurisdiction, "title to territory would have to be determined by applying the usual rules concerning discovery and occupation with any necessary adaptations"[62]. The *res nullius* theory, therefore, may be tenable.

As the present resources of the earth dwindle, so will those of other planets increase in importance. If unoccupied territory in planets may be nationally appropriated, the natural resources of such territory would be governed by the national law of the country concerned.

If the territory were governed by an international régime, international rules would have to be formulated. Jenks finds analogies for such rules in the land claims regulations annexed to the Treaty of February 9th, 1920, concerning the Archipelago of Spitzbergen, or in the mining regulations issued by Norway in pursuance of that Treaty after consultation with the other parties.

While he thinks it desirable that title to the natural resources of other planets be regarded as vested in the United Nations, and that any exploitation should

[58]Galina, A., *op. cit. Note* 2 *supra*, 514.

[59]Meyer, A., *op. cit. Note* 29 *supra*.

[60]U.N. Docs. A/C.1/SR 986 at 9; 991 at 6; 992 at 3; cited by Jessup and Taubenfeld, *op. cit. Note* 3 *supra*, 210.

[61]*Ibid.*

[62]Jenks, C. W., *op. cit. Note* 14 *supra*, 110.

be on the basis of United Nations' concessions, leases, or licences, he admits of the possibility that there may be created on the moon a system under which some territory would be nationally and some internationally appropriated.

Normally when territory is acquired by discovery and occupation, it must "really be taken into possession by the occupying State", and this can be done only by "a settlement on the territory, accompanied by some formal act which announces both that the territory has been taken possession of, and that the possessor intends to keep it under his sovereignty". Further, the possessor must "establish some kind of administration" to show that he really does govern the new territory[63]. "In cases where the nature of a region would make complete occupation virtually impossible", however, "the International Court of Justice . . . has not insisted on the rigid fulfilment of this condition"[64].

If it is decided in the future that stars are *res nullius*, consideration will have to be given to the degree of elasticity with which the rules of occupation will be applied.

Surface Damage Caused by Space-Craft

Some of the problems arising from space flight have more immediate importance, or more immediate effect, than the legal status of stars or of space. All due consideration was doubtless given to the cable received by a President of the United States of America at a time when it was proposed to send a rocket to the moon. This cable informed the President that the sender had registered a claim to part of the moon, and would hold the United States' Government responsible for any damage caused to his property by the rocket[65]. It is to be hoped that rather more attention was given to the question of damage on the surface of the earth rather than of the moon. While the Holguin Cow[66] may now be unwept and unsung, its death drew attention to this very real danger. Space-craft have been destroyed in flight both by design and by their becoming spent and sinking into the more dense layers of the atmosphere where their speed created such frictional heat that they disintegrated.

The grounds of liability will vary under different legal systems. Those possible under the Anglo-American régime — no liability, liability without fault, and liability for negligence — have been listed by Beresford[67], who thinks it probable that the development of the law of liability for damage caused by space-craft will be analogous to that of the similar law for aircraft. At first a strict régime will apply, demanding liability without fault. As

[63]Oppenheim-Lauterpacht, 8th Ed., 1955, Vol. 1, 557, 558.

[64]Lauterpacht, *The Development of International Law by the International Court*, London, 1958, 214 *et seq.*; cited by Goedhuis, *loc. cit. Note* 40.

[65]Related by Becker, JAG Journal, Feb. 1959; see Jessup and Taubenfeld, *op. cit. Note* 3 *supra*, 241.

[66]"Time", Dec. 19th, 1960, 30; Surface damage was alleged to have been caused by a fragment of a U.S. rocket. No claim was made.

[67]Beresford, S. M., Remarks, 11th Annual Congress of the International Astronautical Federation, Stockholm, 16th Aug., 1960.

technology develops, damage due to space-craft, unaccompanied by negligence, will become rare. Finally, with the evolution of safety requirements and high standards of operation, cases may come to be decided according to the general rules of negligence.

In view of the great risks and uncertainty involved, it may be impossible to insure against claims, and one suggestion has been that all interested States contribute to an international guaranty fund which would pay for all damage (excluding intentional damage) caused by satellites[68].

This suggestion would go far towards solving the jurisdictional difficulties foreseen by Beresford, together with the disclaimers of liability which might arise from sovereign immunity or from "discretionary function or duty" provisions, such as are contained in the United States' Federal Tort Claims Act[69]. In any event, there is wide agreement that space-craft should be identifiable, with perhaps a system of international registration, so that it will be possible to detect the author of damage caused on the surface.

The question has been the subject of at least some international agreement. The United Nations' *Ad Hoc* Committee on the Peaceful Uses of Outer Space has agreed to the United States' proposal that the International Court of Justice should be given jurisdiction to decide disputes between States as to liability for injury or damage caused by space vehicles[70].

Haley has sought rather to avoid damage than to allocate responsibility after the event[71]. The earlier satellites broke up on re-entry into the atmosphere, but as these vehicles grow larger and more complex, so will the quantity of metal which may be scattered over the earth's surface. It is essential that the launching State control its satellites so that they fall to earth in a clear area.

When he wrote, Haley had seen "no reference to this vital problem in any of the writings of the natural or social scientists". The two main problems he sees are the necessity of controlling the placement of the re-entering space-craft, and the necessity of being able to rid outer space of objects which would endanger future space navigation.

A further problem is inherent in the transmission of radio signals from satellites. Some of these will be made for an indeterminable time on frequencies which have already been allocated to other users by the International Telecommunications Union. "One must understand that the radio spectrum is very limited, and that the frequencies involved are extremely valuable, and that they may be quite essential to some other services"[72]. There must therefore be a radio-command to silence these satellite-borne transmitters.

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[68]de Rode-Verschoor, I.H.Ph., *The Responsibility of the States for Damage Caused by the Launched Space-Bodies*, Space Law, 434.

[69]Section 2680, Title 28, U.S. Code.

[70]Report of the Legal Committee, U.N. Doc. No. A/AC.98/2 (June 12th, 1959); Jessup and Taubenfeld, *op. cit. Note* 3 *supra*, 217.

[71]Haley, A. G., *Law of Outer Space—Radio Controls Urgently Needed*, Space Law, 458 *et seq.*

[72]*Ibid.*

Proposals for International Agreements

The many conflicts of interest provoked by space flight must at some time be resolved, but there has been no international agreement on how this is to be achieved. The proposals made range from the creation of a widely applicable international convention[73] to a policy of "wait and see", seeking specific decisions on specific questions as they arise[74].

The International Law Association at its Hamburg Conference in August, 1960, considered that in relation to outer space the most important guiding principles which can presently be formulated are that "Outer space and celestial bodies should be utilised only for peaceful purposes to the greatest common profit of all mankind . . .", and that "Outer space may not be subject to the sovereignty or other exclusive rights of any State". It recommended the conclusion of an international agreement embodying and affirming these principles, and directed that its Resolution be submitted to the United Nations.

The Inter-American Bar Association, at its Bogota Conference in February, 1961, approved a Resolution[75] in similar vein, though in greater detail. This dealt with, *inter alia*, the division of space into zones of national and extra-national sovereignty (with a neutral zone which is reminiscent of Professor Cooper's old "zone theory"); the legal status of outer space and the inter-planetary system (*res communis*); absolute liability for damage caused by space craft, and the creation of an international insurance fund for compensation for losses resulting from such damage; the international policing of outer space; and the outlawing of war in space. This Resolution also is to be submitted to the United Nations.

National spokesmen, however, tend to be very circumspect in their remarks on this matter. In the United States, Becker favours the development of a "common law" of space, and comments that even in States where a Civil Law régime is in effect, it is recognised that a body of law can be created only upon a greater body of ascertained fact. He sees danger in transmuting a body of law based on one set of facts (*i.e.* maritime law) into another body of law (*i.e.* space law) in respect of which the basic factual background is as yet very uncertain. The position of the United States is that the law of space should be correlated to the facts of space, and that there is much more to be learned about these facts before it will be possible to define the applicable legal principles.[76]

This outlook is reinforced by the Report of the American Bar Foundation prepared for the United States' National Aeronautics and Space Administration. While agreeing that the use of space should be subject to the rule of law, the

[73]Danier, E., and Saporta, M., *op. cit. Note* 7 *supra*, 303; Resolution of the I.L.A. Hamburg, *loc. cit. Note* 49 *supra*; Meyer, A., *ibid.*; Cooper, *op. cit. Note* 16 *supra*; Jenks, C. W., *op. cit. Note* 14 *supra*; Pépin, E., *Legal Problems of the Sputnik*, 4 McGill Law Journal, 1957.

[74]McDougal, M. S., and Lipson, L., *op. cit. Note* 7 *supra*; Schachter, O., *loc. cit. Note* 15 *supra*.

[75]XII Conference, Inter-American Bar Association, Bogota, Colombia, Feb. 3rd, 1961.

[76]Becker, L., *op. cit. Note* 25 *supra*.

Rapporteurs[77] do not admit that it therefore follows that the time has come to draw up a code of rules for the use of space. "The rule of law", they say, "is neither dependent on nor assured by comprehensive codification, which may help or hinder, depending on circumstances".

Like Becker, the *Rapporteurs* mention the paucity of knowledge available on the actual or prospective uses of outer space, and the varieties of technical, political, and legal considerations which may arise. "In this situation", therefore, "an effort to agree on any comprehensive code might either come to naught, or yield a small set of pious maxims of extreme generality, or produce an unworkable régime that would be all the more dangerous for giving the temporary illusion of certainty".[78]

It seems that the professional anxiety of lawyers to have a determination of the law of space must be tempered by political realities. There is a reluctance on the part of the nations to commit themselves to a definite code which, once made, may well prove difficult to amend to conform with changing circumstances. The case by case method has the imprimatur of the June, 1959, report of the United Nations' *Ad Hoc* Committee on the Peaceful Uses of Outer Space.[79]

Conclusion

People who lived near Anti-Aircraft batteries used to complain that whatever went up had to come down, but in our day some at least of the things which go up, stay up. So far from reducing the dangers of the human situation, this feat has multiplied them, and there is every indication that scientific effort in space will be both continued and intensified.

The law of the sea was granted centuries in which to develop in measure with the progress in maritime navigation. The advances of aviation since 1903, and of space flight since 1957, have been at such a rate as to indicate that the leisured pace of the growth of sea law will be denied to space law. The development of space law may become extremely urgent due to the rapidity of technological progress.

The constant flow of literature upon the subject, and the importance which it is given in the highest legal circles of government, show that it is far from being neglected. The fertility and quality of thought exhibited by the many writers concerned with this aspect of law indicate that there are some grounds for optimism. Dr. Wernher von Braun, the distinguished rocket engineer, has given what is perhaps the soundest basis for the law of space:—"We have developed the rockets for the purpose of sending them to the planets, and not for the purpose of destroying our own".[80]

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[77]Professor Katzenbach of Chicago University; Professor Lipson of Yale University.

[78]Chicago Daily Tribune; New York Times; Dec. 5th, 1960.

[79]*Loc. cit. Note* 70 *supra.*

[80]Cited by Meyer, A., I.L.A. Hamburg, 1960, *loc. cit. Note* 49.