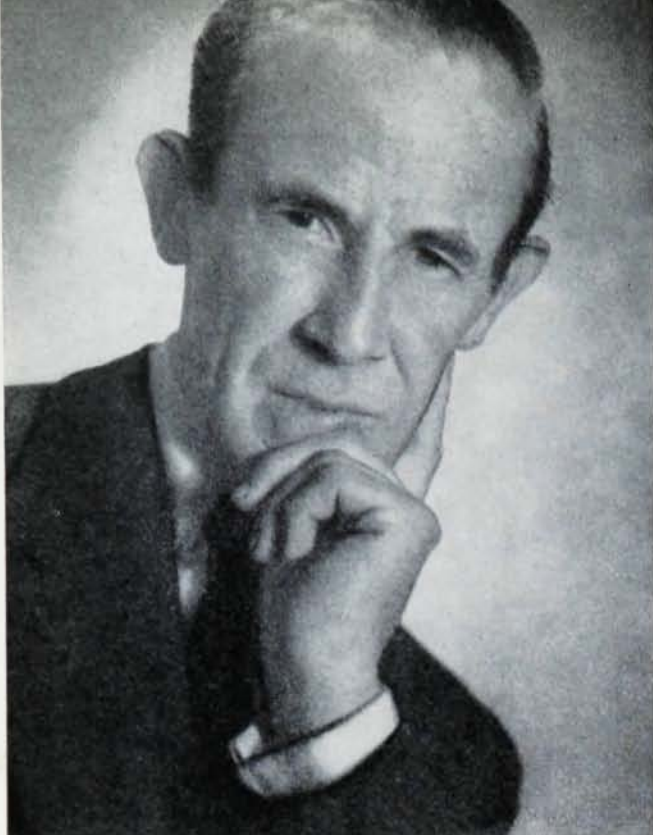




Ronald Fraser, ICSU-Unesco liaison officer, presented the paper upon which this article is based before the American Physical Society on October 27th, 1951, during the 20th Anniversary Meeting of the American Institute of Physics. Dr. Fraser's headquarters are at Unesco House, 19 Avenue Kleber, Paris 16, France.

# UNESCO . . .

## and international cooperation in the physical sciences

By Ronald Frazer

The mutual aim of the United Nations Educational, Scientific, and Cultural Organization (Unesco) and the International Council of Scientific Unions (ICSU) is organized international scientific cooperation. The two agencies and their work are discussed in the following article.

**W**HETHER in the written or the spoken word, I have long chosen to follow the example of Edmund Spenser in his preface to the *Faerie Queene*, when he elects to "thrust into the midst" of his subject with the first line of the first canto.

So let us begin at the beginning with the written Constitution of Unesco . . .

After the famous Preamble, which declares:

". . . Since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed", Article I, entitled "Purposes and Functions", says this:

"The purpose of the Organisation is to contribute to peace and security by promoting collaboration among the nations through education, science and culture in order to further universal respect for justice, for the rule of law and for the human rights and fundamental freedoms which are affirmed for the peoples of the world, without distinction of race, sex, language, or religion, by the Charter of the United Nations."

Article I then goes on to specify the *methods* by which this purpose may be achieved; and paragraph 2 of Article I states, among other things, the following:

"To realise this purpose, the Organisation will . . . maintain, increase, and diffuse knowledge . . . by encouraging cooperation among the nations in all branches of intellectual activity. . ."

Now it is a fact of observation that a large proportion, if not the majority, of interested persons, if they get beyond the Preamble, never read further than Article I, paragraph 1, of the Constitution. Hence in the early councils of Unesco there developed a marked dichotomy of purpose: the purpose of the *direct* approach to the problem of peace and security, through propaganda and by persuasion of the masses; and the purpose of the *indirect* approach, through international cooperation at an already tolerably well-informed level.

International cooperation in the sciences must of necessity belong to the indirect approach, although nevertheless along a line which *converges* towards that which leads straight to the chief goal of Unesco's efforts—peace and security. Any individual scientist is of course free of himself to take the direct line, but he does so in his generalised capacity as a citizen, not in his specialised quality as a scientist. Any contribution of scientists as scientists to Unesco's aims must in short be in the direction of *organised international cooperation*.

This fact was recognised very early in the history of Unesco by the first Director of the Natural Sciences Division of the Unesco Secretariat: Joseph Needham. It was largely on his initiative that, close on the heels of the first General Conference of Unesco, held in Paris in the fall of '46, a Formal Agreement between Unesco and the International Council of Scientific Unions was drawn up and signed, to run from January 1, 1947.

Let us look first at the second partner to the Agreement—ICSU; and I would begin by underlining what ICSU is *not*. ICSU is not, as I find it to my recurrent but increasingly mild surprise to be so often pictured, even by the minority of scientists interested in the international organisation of the sciences: as a sort of captive balloon—filled, of course, after the primitive method of the brothers Montgolfier, with Hot Air—sent aloft above the international world by the United Nations in general and Unesco in particular.

And how small a world this is, both in space and time, which we who are internationally minded find it so desperately difficult to unite . . .

I gave this talk in the Louis Seize Room of the Hotel Sherman in Chicago. I came from Paris to do so. In Paris I live in an apartment in the district of Passy (mark that name well for the sequel!). From the balcony we look out over the roof tops to the Seine, flowing below us in the valley, just at the point where the river is spanned by the Pont de Grenelle, on which stands the prototype of the Statue of Liberty; and we can look downstream to the trees of the Royal Park of St. Cloud, there on the southern skyline, beyond which lies Versailles.

Now it was in the courtyard of the Palace of Versailles on September 19, 1783, that the elder Montgolfier (that would be Joseph Michel) demonstrated his invention—"sa Machine Aerostatique"—before the King (Louis Seize), his Queen (Marie Antoinette), and all the Court.

Contemporary accounts of the event \* described how 80 lbs. of burning straw, and 5 lbs. of chopped linen rags sufficed to produce the necessary 37,500 cubic feet of Hot Air; and how the balloon swelled, swayed, and finally rose majestically aloft before the astonished spectators to a height of 240 toises—in other words, around 500 meters above ground . . . And that in spite of a load in the envelope amounting to no less than 200 lbs.

The accounts don't specify the nature of the load; but fortunately this detail is supplied by that prototype of all scientific internationals: an American citizen called Benjamin Franklin. In a letter to his friend Sir Joseph Banks in London, dated Passy October 8, 1783, he says: "The Basket contained a Sheep, a Duck, and a Cock, who except the Cock received no Hurt."

But to return, via the sheep, of course, to our mutations and to modern times; ICSU was born, not as the child of Unesco, but coterminously with the American Institute of Physics, in 1931, as the *spontaneous* federation of the then existing seven International Scientific Unions: namely, in order of seniority: Astronomy, Chemistry, Geodesy and Geophysics, Geography, Biology, Radio-Science, Physics.

ICSU was from the beginning, and has happily remained, a true federation. The Council fulfills the duties proper to any federal parliament in regulating such interests of the Unions as are common to all, while fully respecting their individual autonomy, each within its own domain. Note too that the national bodies which adhere either to the Council as such, or to the federated Unions, are by Statute primarily the National Academies and National Research Councils. In other words, ICSU is classed in the international world as a *Non-Governmental Organisation*, as distinct from Unesco, which is *intergovernmental*.

Thus in 1947 ICSU entered into an agreement with Unesco, not only as a completely separate, independent, and *different* entity, but as the senior, if decidedly less affluent, partner.

Article I of the original Agreement is in fact a statement of *mutual* recognition: Article III, titled "Mutual Consideration", takes the practical step of appointing a Liaison Officer to represent ICSU and the Unions at Unesco Headquarters in Paris, while Article VIII promises "Such financial support as may be required to enable the International Council of Scientific Unions to develop its programme adequately."

\* Chiefly "Description des Experiences de la Machine Aerostatique des Mssr. de Montgolfier", Faujas de Saint Fond Paris 1783, and "Observations sur la Physique etc." Mgr. le Comte d'Artois; Paris 1784; which I was able to consult at the Library of Congress in Washington.

This last promise has been fulfilled on the following scale:

*Total Subventions to ICSU and the Unions*

| 1947      | 1948      | 1949      | 1950      | 1951      |
|-----------|-----------|-----------|-----------|-----------|
| \$256,130 | \$238,374 | \$256,425 | \$189,859 | \$189,200 |

in which the devaluation of sterling and related soft currencies is of course reflected in the figures for 50/51.

Of these annual totals, the Unions representing the Physical Sciences have received:

*Allocations to the Physical Sciences*

|       | 1947     | 1948     | 1949     | 1950     | 1951     |
|-------|----------|----------|----------|----------|----------|
| IUPAP | \$16,056 | \$17,300 | \$19,900 | \$19,480 | \$12,850 |
| IUCr  | 8,000    | 8,000    | 20,000   | 6,800    | 8,500    |
| IUGG  | 25,400   | 34,270   | 16,800   | 15,759   | 22,400   |
| URSI  | 5,628    | 9,000    | 6,000    | 5,675    | 4,000    |
| IUTAM | —        | 7,200    | 7,200    | 6,985    | 3,500    |

We must next ask: For what *purposes* have these global sums been used?

Here it is important to observe that it is the Unions which have proposed annually to Unesco the detailed objects of the Unesco subvention; it is Unesco which has *decided* the extent of the aid to be given to these requests.

The purposes for which aid *can* be requested and granted are set out in the Directives Governing Subventions to Non-Governmental Organisations, first framed at the Third General Conference of Unesco in 1948 at Beirut, and given their present form at the Fifth General Conference at Florence in 1950.

Now there are six valid purposes for which ICSU and the Unions can ask and be given financial aid. They are:

1. The *organisational expenses* of important periodic international conferences of the organisation, of important regional conferences for which the organisation assumes responsibility, and of symposia with limited attendance . . .

2. The *costs of publication*:

(a) Of reports or proceedings of such meetings . . .

(b) Of certain journals, books, reports, or monographs sponsored by the applicant non-governmental organisation.

3. The *travel and subsistence expenses of the officers and members of the governing board or its committees* of the organisation concerned for authorised attendance at meetings of the governing board or its committees . . .

4. A contribution to the *travel and subsistence expenses* of a limited number of *participants in conferences and symposia* . . .

5. Part of the expenses of the *normal permanent* educational, scientific and cultural *activities* of the organisations concerned . . .

6. Part of the expenses of a limited number of *existing laboratories of international standing* . . .

It is Unesco which holds the balance between these six purposes, by laying down each year the maximum percentage of the total grant which may be used for any one purpose. Thus for 1952 the proportions read:

| Purpose:                   | 1 | 2  | 3  | 4  | 5  | 6 |
|----------------------------|---|----|----|----|----|---|
| Percentage of total Grant: |   |    |    |    |    |   |
| (Approx)                   | 1 | 25 | 21 | 24 | 20 | 9 |

Further, Unesco reserves the right to raise objection to any single item of the ICSU program, even though formally it conforms to one of the prescribed purposes.

Now let us see what *scientific aims* have been reached to date under this scheme. Let us relate the six purposes of the Unesco Directives to the programs and projects of the five Unions we are interested in.

1. *First, Organisational Expenses*: This is a new category, absent in the initial "Beirut" directives. Actually therefore it concerns the future rather than the past. Now everyone, ICSU and Unesco alike, agrees that this privilege must be used sparingly; nevertheless, when URSI chose Australia as the venue of its 1952 General Assembly, because there has grown up there, with incredible postwar speed, the leading school of Radio-Astronomy—then neither ICSU nor Unesco forgot that fact, in assessing the claims of one of our oldest international Unions. On October 17 of last year, at Washington, ICSU voted \$900 to the Union towards the organisational expenses of the Australia meeting.

2. *Publications*: I showed at Chicago a very small selection of books, journals, and reports, recently published by the Unions with the financial aid of Unesco, which I assembled with the help of my colleague and close friend, Dr. Wang Ging Hsi of the Natural Sciences Department of the Unesco Secretariat. A list of the items exhibited is set out in Appendix A, at the end of this article.

3. *Travel and subsistence expenses* of the officers and members of the governing board . . . of the organisation . . . : In October of last year, the Executive Board of ICSU voted \$8000, out of the total subvention for 1952 of \$180,000, to the IGU, toward the expenses of their General Assembly in Washington, August 1952; \$9000 to the Radio Science Union, for their General Assembly in Australia, \$5000 to IUTAM for their General Assembly in Istanbul—and, following the special plea of Dr. Erim Kerin, the leading Turkish hydrodynamicist—an additional \$2500 towards the cost of bringing a group of carefully selected young scientists from the countries of the Middle East to Istanbul, to participate in the scientific discussions.

4. *Conferences and Symposia*: Symposia have high priority in the list of purposes . . . It is when men from all over the world gather in one place—perhaps Bombay—to discuss a topic of real mutual interest—maybe the physics of fundamental particles—under the leadership of a really big man in the field—say Honi Bhabha—that the chain reaction of new ideas is initiated: as happened in sober fact in December 1950.

A reasonably good return for the \$7,750 in hard cash that Unesco put up for the occasion.

5. *Normal Permanent Activities*: And here we are on stony ground—the word “permanent” being the biggest rock . . . Unesco says—and superficially it sounds eminently reasonable—“We are a catalyst, not a milk cow”. BUT, the physical sciences whose laboratory is the earth, rather than a few cubic feet of highly evacuated apparatus—and among these again pre-eminently IUGG—regard their “permanent services” as their most cherished possessions . . . Thus the International Seismological Summary in Kew, England, vital for the mapping of earthquakes; the International Isostatic Institute in Helsinki, Finland, essential for the ever more exact determination of the shape of the earth; the International Latitude Service in Turino, Italy, that determines the shift of the true pole in time; the Bureau de l'Heure in Paris, France, that gives out absolute time signals at exactly spaced time intervals; these transfuse the lifeblood of an earth science like geophysics into the body of future experiment.

6. *International Laboratories*: These, coming directly under the Council of ICSU, are three in number, namely:

Hochalpine Forschungsstation Jungfraujoch,  
Switzerland  
Stazione Zoologica di Napoli, Italy  
Institut Océanographique de Monaco, France

All follow the same organisational pattern, in that the *administrative* responsibility is in each case a

*national* one—Swiss, French, Italian as the case may be; while the *scientific program* of the laboratory or station is looked after by an *international* council.

And there the tale ends; but I should like to make one final point:

Implicit in the telling of the whole story is a fundamentally important aspect of modern scientific life; its centrifugal-centripetal, two-edged sword aspect. In these days, every working scientist is acutely aware of an ever-increasing sociological pressure brought upon him to think in *national* terms: of national economy, of national defense . . . He is equally aware of the fact that every scientific discovery is a two-edged sword; and he knows you can't blame it on God that mankind is to be found with monotonous persistence busily whetting the wrong blade.

In counterpoint, we can be quite certain that when a group of scientists from all over the world—and I mean all over the world; next September the Russians join in the General Assembly of IAU in Rome—get together to work out a fundamental problem of their craft, then they are working together on a building, designed I think by the same architect as was employed by Karl Darrow in his memorable talk on October 25, which is described so marvelously by Rainer Maria Rilke in his *Stundenbuch*:

“Werkleute sind wir: Knappen, Jünger, Meister, und bauen dich, du hohes Mittelschiff. Und manchmal kommt ein ernster Hergereister, geht wie ein Glanz durch unsre hundert Geister, und zeigt uns zitternd einen neuen Griff.”

## Appendix A

1. International Astronomical Union, “Transactions of the International Astronomical Union”, Volume VII, 1950.
2. International Union of Pure and Applied Chemistry, “Comptes Rendus de la Quinzième Conférence”, Amsterdam, 5–10 Septembre 1949.
3. International Union of Pure and Applied Chemistry, “Tables de Constantes et Données Numériques”, 3. Constantes sélectionnées. Pouvoir Rotatoire Magnétique (Effet Faraday), par R. de Malleman; Effet magnéto-optique de Kerr, par F. Suhner.
4. International Union of Crystallography, “Acta Crystallographica”, Vol. 4, Part 2, pp. 81–192, March 1951.
5. International Union of Crystallography, “Structure Reports for 1947–48”, Vol. II.
6. International Union of Biological Sciences, “Catalogue des Echantillons Types des Collections de Paléontologie du Muséum National d'Histoire Naturelle de Paris”, Série C (Section de Zoologie) N° 2.
7. “Catalogue Systématique des Types de Trochilidés du Muséum National d'Histoire Naturelle de Paris, par Christian Jouanin”, Série C (Section de Zoologie) N° 3.
8. “Genetic Neurology, Problems of the Development, Growth, and Regeneration of the Nervous System and of its Functions”, Série B (Colloques) N° 6.
9. “Problèmes de l'embryologie physio-génétique”, Série B (Colloques) N° 8.
10. “Les bases écologiques de la régénération de la végétation des zones arides” (On the ecological foundations of the regeneration of vegetation in arid zones), Stockholm, July 1950. Série B (Colloques) N° 9.
11. “Resumptio Genetica”, Deel XIX, Afl. 1–2.
12. International Geographical Union, “Newsletter”, Volume II, N° 1, January 1951.
13. “Bibliographie Cartographique Internationale, 1948.”
14. International Union of Geodesy & Geophysics, Association of Terrestrial Magnetism and Electricity “Geomagnetic Indices, K and C, 1948.” Bulletin No. 12b.
15. Association of Terrestrial Magnetism and Electricity, “Transactions of Oslo Meeting”, August 19–28, 1948.

16. “Bulletin géodésique”, organe de l'Association Internationale de Géodésie. N° 18, 1er Décembre 1950.
17. International Union of Pure and Applied Physics, “Helvetica Physica Acta”, Internationaler Kongress über Kernphysik und Quantenelektrodynamik. Volumen XXIII, Supplementum III.
18. International Commission of Optics, “Optica Acta.” Special Issue May 1951.
19. International Union of Theoretical and Applied Mechanics, “Rapport 1950.”
20. “Internal Damping of Materials”, 1. Research Progress in U. S. on the Damping of Vibrations (March 31, 1951).
21. “Internal Damping of Materials”, 2. Die Forschung im Gebiet der Schwingungsdämpfung fester Körper im Deutschen Sprachgebiet (1938–1950).
22. International Union of Theoretical and Applied Mechanics and International Astronomical Union, “Problems of Cosmical Aerodynamics”. Proceedings of the Symposium on the Motion of Gaseous Masses of Cosmical Dimensions held at Paris, August 16–19, 1949.
23. International Scientific-Radio Union, “Recueil des Travaux de l'Assemblée générale tenue à Zurich du 11 au 22 Septembre 1950.” Volume VIII, 1ère partie.
24. “Special Report N° 1 on Solar and Galactic Radio Noise.”
25. “Rapport Spécial N° 1. Bruits Radio-électriques solaires et Galactiques.”
26. “Information Bulletin N° 68”, March–April 1951.
27. “Bulletin d'Information N° 68”, Mars–Avril 1951.
28. International Union of the History of Science, “Le R. P. Henri Bosman, S. J.”, Notice biographique—Bibliographie. Brochure N° 4 de l'Union Intern. d'Histoire des Sciences.
29. “Archives Internationales d'Histoire des Sciences”, Quatrième Année—Numéro 16. Juillet 1951.
30. International Union of Geodesy & Geophysics, “The International Seismological Summary”, 1937 January, February, March.
31. “Fauna e Flora del Golfo di Napoli”, Pubblicata della Stazione Zoologica di Napoli. 3ª Puntata—1 parte.
32. “Annales de l'Institut Océanographique”—Tome XXIV—Fasc. 2.
33. “Annales de l'Institut Océanographique”—Tome XXIV—Fasc. 3 et dernier.