

# Introducing the «CERN Courier»

For a long time, the need has been felt for a publication giving news of CERN to its staff.

Our news service will cover all aspects of the official activities of the Organization-scientific, tech-

The Director-General pointed out this need very early. Plans were made, but circumstances unfortunately prevented them from being carried out.

Now that the practical difficulties have been overcome, we are pleased to be able to present the first issue of our magazine to you.

What will the «CERN COURIER» be? Essentially an information paper intended to help every staff member to feel at home in the Organization and to maintain the ideal of Euro-



## A Word from the Director-General

It is a pleasure to introduce our long expected internal bulletin.

I hope it will benefit not only from your attention but also from

the many suggestions which will certainly arise in CERN's fertile minds.

O.J. Balla

pean co-operation and the team spirit which are essential to the achievement of our final aim: scientific research on an international scale. Accordingly we want to keep CERN staff members informed of what is going on, so that they should not feel isolated through now knowing how their work fits into the general scheme. nical and administrative. Every month we shall try to present this news in fairly simple form.

These are the main ideas behind the publication of this periodical. We feel we may help in this way to establish close ties between those who have come from many countries to contribute to CERN's scientific and European achievements.

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## «CERN Courier»

is published monthly for the staff of the European Organization for Nuclear Research. It is distributed free of charge to members of the Organization, to scientific correspondents and to anyone interested in problems connected with the construction and operation of particle accelerators or in the progress of nuclear physics in general.

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### In our next issues

- The first of a series of articles on CERN's non-stop offensive against the atom:
  « 24 hours of SC life »
- CERN scientists talk to you about the Kiev Conference.
- Nuclear physics for all

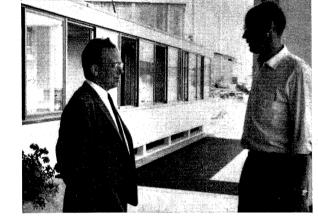
On his way to Russia on July 14th, Professor Wolfgang Panofsky called at CERN and submitted himself with good grace to our interview.

Professor Panofsky was born in Berlin on April 4th 1919. He received an A. B. (Bachelor of Arts) degree et Princeton in 1938, and a Ph. D. (Physics) degree at the California Institute of Technology in 1942, the very year he became an American citizen.

Then began his striking career in high energy nuclear physics. First a technical director at the Office of Scientific Research and Development, he was assistant professor of physics at the Radiation Laboratory of California from 1945 until 1948. That year he joined Stanford University as an Associate Professor; he became full Professor in 1951.

Director of the Stanford University High Energy Physics Laboratory since 1953, Prof. Panofsky has supervised the work of several research groups operating two of Stanford's linear accelerators : the 700 and the 40 MeV machines. One of the research groups headed by Prof. Panofsky himself was conducting experiments on basic

Who is who in CERN



Professor W.Panofsky to work at CERN

Professor Panofsky talking to Dr. Lofgren the day before they left for the Kiev Conference. Dr. Lofgren, who is at present at CERN, was in charge of the 6.2 GeV Bevatron group at the University of California Radiation Laboratory (Berkeley). (CERN Photo)

Professor Panofsky's interests—besides his five children—are all in nuclear physics, especially high energy physics. He has been called upon in connection with various nuclear matters. Consultant in New Mexico for the Atomic Energy Commission in 1945, Wolfgang Panofsky is now a member of the National Academy of Science and of the President's Scientific Advisory Committee.

Scheduled to begin work at CERN late in June, Prof. Panofsky was then appointed head of the American technical experts discussing ways to control high altitude nuclear tests. Three weeks later an agreement had been reached. Only then was our new guest professor able to join the Organization... only to fly off to Russia the next day as American rapporteur on the progress at Stanford.

After his return from the Annual International Conference in Kiev, Professor Panofsky will spend some five months in CERN under a Ford Foundation grant. He will work in Professor Bernardini's Synchro-Cyclotron Division (S.C.).

## **SWEDISH OFFICIALS IN CERN**

Statssekreterare Hans Löwbeer, a high official of the Swedish Ministry of Education, was welcomed in CERN on June 4th. He and one of his closest collaborators, the byrachef Sven Moberg were welcomed by Professor C. J. Bakker and Mr. S. A. ff Dakin.

After an introductory talk about the general purposes and aims of CERN, the Director-General and the Director of Administration took their guests for a tour of the site. Our visitors were shown around the SC, where they met two of their compatriots, Mr. O. Frederiksson and Mr. G. von Dardel. In the STS Division, Mr. Moberg expressed particular interest in the Mercury computer.

The party had lunch in a wellknow establishment of Echenevex, then came back to the site for a visit of the PS under Mr. Adams's guidance.

# After the Thirteenth CERN Council Session

Is there a need to say any more about the 13th session of the CERN Council which was held here on May 27th last?

We think there is because, owing to the lack of space, we had to concentrate on the more spectacular aspects in the brief account which appeared in the Staff Association Journal. Paradoxically enough, the first of the articles which should have figured here appeared in another publication ! The event was of such interest that the Association's kind offer to grant us some space in its Journal was enthousiastically accepted.



A view of CERN Auditorium taken during the last Council Session. (CERN Photo)

#### What is the Council !

What else should be said about the Council session? Should we tell you about the progress in all the Divisions, which was reported then? We thought it best to discuss this in separate articles.

As regards the Council, we simply propose to describe what it is in some detail, for although everyone is always perfectly aware of its existence, its composition and the reasons behind its sessions are perhaps less well known.

Briefly then : each Member State sends at the most two delegates to the Council, who may be accompanied by advisers. The Council elects a President and two vice-Presidents who hold office for one year and may be re-elected on not more than two consecutive occasions. As for the purposes of the meetings, they are many :

a) to determine the Organization's pol-

The Austrian flag being hoisted alongside the flags of the other Member States, ten minutes after the CERN Council had decided to admit Austria as a member of the Organization. (CERN Photo).



icy in scientific, technical and administrative matters ;

- b) to approve detailed research plans and decide on any supplementary programmes;
- c) to adopt the budget and determine financial arrangements ;
- d) to control expenditure and approve and publish the audited accounts of the Organizations;
- e) to decide on the staff establishment required ;
- f) to publish an annual report ;
- g) to have such other powers and perform such other functions as may be necessary for the complementation of the Convention.

And what is the object of the Convention may you ask? It lays down the very purposes of CERN, which it may be useful to recall over again.

On 1st July 1953, the Convention laid down that an international laboratory should be created for the purpose of carrying out an agreed programme of nuclear research of a pure scientific and fundamental character.

Article II of the Convention says: « The Organization shall provide for collaboration among European States in nuclear research of a pure scientific and fundamental character and in research essentially related thereto. The Organization shall have no concern with work for military requirements and the results of its experimental and theoretical work shall be published or otherwise made generally available. »

When it was established, in 1953, the basic programme of the Organization comprised :

- 1. The construction of an international laboratory for research on high energy particles, including work in the field of cosmic rays. This laboratory was to consist of :
  - a) a proton synchrotron for energies above 10 gigaelectronvolt 10<sup>10</sup>eV) (Editor's note : energy since increased to 25 GeV);
  - b) a synchro-cyclotron capable of accelerating protons up to approxi-

mately 600 million electronvolt (6 x 10<sup>8</sup> eV);

- c) the nessessary ancillary apparatus for use in the research programmes carried out by means of the machines referred to in a) and b) above;
- d) the necessary buildings to contain equipment referred to in a), b) and c) and for the administration of the Organization and the fulfilment of its other functions.
- 2. The operation of the laboratory specified above ;
- 3. The Organization and sponsoring of international co-operation in nuclear research, including co-operation outside the laboratory. This co-operation may include, in particular :
  - a) work in the field of theoretical nuclear physics ;
  - b) the promotion of contacts between, and the interchange of, scientists, the dissemination of information, and the provision of advanced training for research workers;
  - c) collaboration with and advising of national research institutions;
  - d) work in the field of cosmic rays.

It should be noted that any supplementary programme has to be submitted to the Council and requires approval by the two-thirds majority of all the Member States.

Article II ends very judiciously by advocating co-operation between CERN and laboratories and institutes in the territories of Member States : « So far as is consistent with the aims of the Organization, the laboratory shall seek to avoid duplicating research work which is being carried out in the said laboratories and institutes ».

These, then, are the main points of the Convention which established our international Organization.

Other articles of the Convention deserve mention here, especially those relating to the conditions for the admission of a country to membership of CERN. These will be dealt with in a subsequent article.

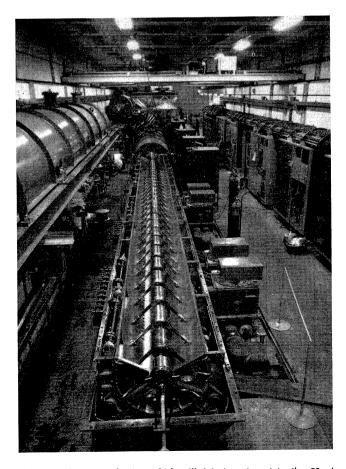


The last magnet unit being towed towards the PS ring. (CERN Photo)

O riginally scheduled to begin operation in 1960, the 25 thousand million electronvolt proton synchrotron building at CERN is now reaching its final stage. Since January the total PS staff has increased from 230 to 287. The mechanical workshop has started to make room for the shielding wall in the South Experidental Hall. Nearby, pneumatic drills are hewing out the rock for the foundations of the experimental apparatus generator hall.

However, it is in the ring of the synchrotron itself that the biggest changes have occurred.

Here is a brief account of the situation on the 25th of July as regards the assembly of the gigantic particle accelerator, 600 ft. in diameter.



The CERN linear accelerator, which will inject protons into the PS at 50 MeV. The two cavities in the background at present supply a 30 MeV beam. (UKAEA Photo)



#### All 100 magnets in position

Friday the 10th of July was a flag day for the PS Division. At 3.10 p.m. the squat electric locomotive which pulled all the magnets units into the ring, slowly towed its last load towards the tunnel. With the hundred 38-ton units of the electromagnet in position, a major phase in PS construction can be regarded as terminated.

In the South Experimental Hall, the reference unit which measured the magnetic properties of the 100 functional units, has been hauled away from its concrete cradle and the rails laid for the transport of the units into the ring building have been removed. These events can be looked upon as a historical «burning of bridges». There is of course a permanent track running from the tunnel to the north experimental hall, inside the ring circle. Nevertheless these removals symbolize the prevailing confidence of the Division, now that all separate components of the machine have been carefully tested.

But by no means was the work on the magnets positioning finished. Certainly not in the opinion of the team surveying final alignment of the electromagnets. It takes 2 hours to align each of the 100 units to a radial tolerance of  $1/_{10}$  mm over a circle 600 ft. in diameter. Therefore the magnitude of the survey team's task can be appreciated. Even after the magnets have been energized for some time, further checks and adjustments will be necessary. And later on, measurements will have to be performed twice a year, taking advantage of a temporary stoppage...

Those who have business in the ring will have spotted a notice with two flickering lights, saying : «Tunnel blocked at 46th magnet ».

This warnig anticipated 27 July, the date of the first energizing of the magnets. In preparation for it there was a final test of connections and a so-called « superficial examination » to make sure no tools or foreign objects subject to magnetic influence had been left on the units or in their gaps. The ring was blocked to ensure that this thorough examination should be final.

#### Two Linac cavities in operation

The first two cavities of the 50 MeV linear accelerator designed to inject particles into the annular vacuum chamber, have been in operation since the end of May. They have produced 30 MeV protons, i. e. three fifths of the linac ultimate energy.

Thirty MeV protons are produced only on a few evenings a week. High energy, high intensity beams of this sort create ionizing radiations and a radioactivity hazard is involved. So that fitters can carry out their job safely on the third and last cavity, the beam delivered during tests by the first two is usually cut down to 10 MeV.

As for the intensity of the proton current—the number

## ACHING TIONAL STAGE

of particles produced as separate from their energy this reached 3.5 milliamperes at this printing. The value, explains J. B. Adams, Director of the Division, is exceptionally high. The current expected at this stage was only 1 milliampere.

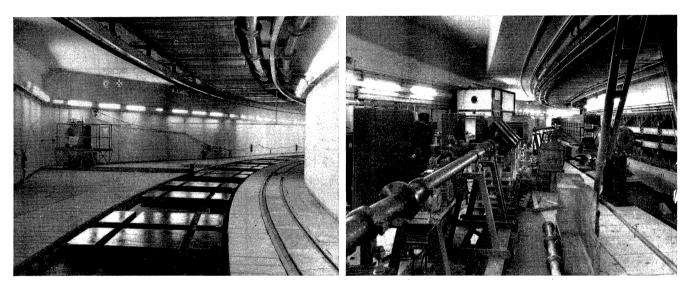
Assembly of the last cavity has been slowed down by

### Sixteen accelerating units

The vacuum chamber passes through radio-frequencycontrolled accelerating units designed to impart successive pushes to the protons.

CERN PS has 16 such acceleration units. All have been mounted in the ring and connected to their power supplies. The only component of the radio frequency system on which work still remains to be done is the beam control apparatus. All parts of this have however been finished and individually tested and only their assembly remains — mostly in the upper room at the ring centre—and their final testing in situ.

The frequency programming system having already been set up for some time, its final testing awaits excitation of the magnets. In point of fact, the assembly of the entire machine has reached the point where all vital components fit together in order to constitute a functionally integrated unit. For instance, trials of the magnet power supply could not be performed with its



The view of the 25 GeV accelerator tunnel taken two years ago (left) and that on the right taken a few weeks ago at the output end of the Linac, show the progress made in the construction of the machine. (CERN and UKAEA Photos)

leaks in the vacuum system. «The linac has a thousand high vacuum joints and we are not in the least surprised to have run into trouble in this field », the vacuum technicians point out.

The difficulties which they have the habit of facing are responsible for the particular attention they bring to their designs. The vacuum system of the « big machine » numbers no less than 72 pumps all of which are installed at this writing. About 30 % of the 628 m long annular vacuum chamber has been pumped down to a pressure of 2.10<sup>6</sup> mm of mercury, which equates approximately 3 parts in a thousand million of the normal atmospheric pressure.

This elaborate pumping system is necessary to permit circulation of the stream of protons in the vacuum chamber so that as few as possible collide with air molecules thus being slowed down and scattered. final load before 27 July, since it was impossible to simulate the special load conditioned by all the magnet units.

The full importance of this date, 27 July, can therefore be stressed : it was the day when the 3,800-ton electromagnet was energized for the first time. It then became possible to begin to evaluate the performance of the accelerator components operating as a unit.

On going to press, this evaluation has not yet been completed. Nevertheless the outlook is very promising, as echoed by the words of H. G. Hereward, who gave many of the facts mentioned above : «We are very optimistic...»

Optimistic is indeed the word and with such perspectives and the keenness they breed, there is very little doubt that the PS team will succeed in producing a proton beam in time for Christmas.

### THE «RECEPTION» TRENCH

We have been asked: « What is the enormous excavation at the CERN main entrance ?  $\ensuremath{\mathsf{\scriptscriptstyle N}}$ 

The Technical Services section of the SB Division have given us the answer. The main tunnel containing the water pipes, electric cables etc., linking the Power House to the rest of the CERN site, had to be dug underneath the concrete slab supporting the road. It was considered at the time that this slab would be sufficient to prevent water from draining into the tunnel.

Experience showed that this was not so. It was therefore decided to make the tunnel watertight—and this is the work that has been done.

# Other Peoples' Atoms

Under this heading, we shall publish from time to time the latest news about foreign accelerators or nuclear research.

We expect thus to keep CERN members well informed of what is going on in our particular field and help them to fit CERN into the accelerator's international picture.

The Editor

#### A 40 MeV LINAC FOR GERMANY

The manufacturers of CERN's 50 MeV linac announce they have obtained an order for a 40 million electronvolt linear accelerator from the City of Hamburg for DESY, the Deutsches Electronen SYnchrotron.

The new linac, which is of the travelling-wave type will by energized by short wavelength radiofrequency power; the electrons will be accelerated along a specially shap-

## Signing of the Site Agreement

One of the most important announcements made at the last Council session concerned the signing of the Site Agreement between the « Etat de Genève » and CERN.

The Agreement was signed before a notary on 11 February last. The Director-General, Professor C. J. Bakker, represented CERN, while Messrs. Dutoit and E. Chamay, Conseillers d'Etat, respectively in charge of the Public Works and the Finance and Taxation Departments, signed on behalf of the Etat de Genève.

Before the signature of the Convention of 1st July 1953 establishing the European Organization for Nuclear Research, the Swiss Confederation and the Conseil d'Etat of the Republic and Canton of Geneva had put at the disposal of CERN the land it required for the construction of its installations. This land amounted to 40 hectares, 63 ares and 29 m<sup>2</sup> within the boundaries of Meyrin and Satigny.

Under the agreement signed on 11 February, the Etat de Genève grants CERN a «personal right of use» for an indefinite period in respect of the present site ; this right of use is transferable and will also apply to any other land which the Etat de Genève may place at CERN's disposal.

The Agreement also specifies that CERN will assume full responsibility for all maintenance charges relating to its installations. On the other hand, expenditure incurred for the installation of water and electricity supplies will be shared between the Etat de Genève, CERN and the «Services industriels de Genève».

The Agreement concluded between CERN and the Etat de Genève is the result of a long series of negotiations.

This new advance towards putting CERN on a permanent fooling is characteristic of others made by our Organization in the course of its short but fruitful existence. ed waveguide. The equipment comprises five sections of accelerating waveguide, each 1.5 m. long, and has an overall length of about 10.7 m. (35 ft), together with an electron gun and pre-buncher at the injector end.

Each accelerator section will be fed by high-power klystron. The value of the whole order, together with controls and other services amounts to about 250 000 sterling pounds.

#### U. S. TO DOUBLE ACCELERATORS BUDGET BY 1963 ?

It was announced in Washington last May, that the Presidential Science Advisory subcommittee headed by Dr. Piore, had recommended that the U.S. more than double its investment in atom smashers. This would increase accelerator research expenditure from the present \$ 59,000,000 annually to \$ 135,000,000 by 1963. Of course no official decision has been taken yet, and the recommendation has still to get successive clearings from Dr. James Killian, President Eisenhower and the United States Congress.

While aiming at developing U.S. accelerators, the recommendations also suggested increasing international co-operation in high energy nuclear research.

The report issued by the Committee points to the « most urgent » need of high energy electron accelerators, of which the Stanford 40 GeV linac (see below) is a typical example. On the other hand, there should be no immediate requirement for building proton accelerators more powerful than the 30,000,000,000 eV now under construction at the Brookhaven National Laboratory, Long Island. Finally, there is an «urgent need» for lower energy proton accelerators producing more intense beams of particles.

It is of interest to note the United States now has 15 accelerators with energies above 200 MeV and 4 with energies above 1 GeV.

#### STANFORD UNIVERSITY STIRS EXCITEMENT

Stanford University, in California, already has a leading position as far as linear accelerators are concerned. It operates a whole family of linacs, several of which are used for medical purposes. The 220 ft. machine in operation there produces 700 MeV electrons and its energy will be stepped up to 1050 MeV.

Late in May, Stanford made the scientific headlines, again with a linac.

Addressing a science research symposium in Manhattan, President Eisenhower announced he would recommend to the U.S. Congress the financing of a «large new electron linear accelerator... a machine two miles long, by far the largest ever built ».

This machine intended for Stanford University would be one of the most spectacular atom smashers ever devised. Two parallel tunnels would have to be driven for 2 miles into the rock of a small mountain in the vicinity of Palo Alto. Such natural cover would of course stop any dangerous radiations. One of the tunnels, the smaller in diameter, would house the accelerator proper, while the bigger one would be used for maintenance purposes.

The proposed new linac for Stanford would initially produce 15 BeV (GeV) electrons; it is announced this energy could later be raised to 40 BeV. It is believed the machine would take 6 years to build, at a cost of 100 million dollars.

Approval of the project now only taken after Congressional hearings depends upon the decision to be held in July. B ETWEEN July 14-17, several CERN scientists left Geneva «en route» for Russia. They were to return to the Organization between July 28-30 after a stay in Kiev and a visit to Dubna.

In Kiev they attended the 1959 Annual International Conference on High Energy Physics, held under the sponsorship of the IUPAP (International Union of Pure and Applied Physics).

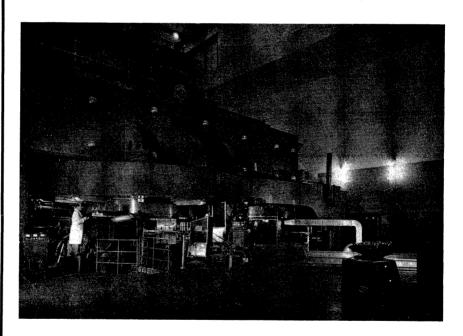
CERN participants in the Conference were Professor C. J. Bakker, Director General of CERN and Chairman of the IUPAP High Energy Commission, Professor G. Bernardini, Director of our Synchro-cyclotron Division (SC), Doctor S. Fubini from the CERN Theoretical Studies Division (TH), Doctor W. The Kiev Conference was to last from July 15 to July 25 and to be followed by a visit to the Russian equivalent of CERN : the Dubna center near Moscow.

We expect to publish an account of this trip in our next issue. As for now, it may be said that besides CERN participants, other prominent names in the field of nuclear physics are found in the agenda of the Conference. Among them : Alvarez, Panofsky and Segré for the U.S., and Tamm and Veksler for the USSR.

A few other members of CERN also went to Kiev as delegates of their respective countries. They were :

Prof. J. Ashkin (US), Prof. R. Hofstadter (US), Prof. L. Ledermann (US), Dr. A. Lundby (Nor-

## OFF TO RUSSIA



The CERN scientists who took part in the Kiev Conference visited the 680 MeV synchro-cyclotron in service at the Dubna Research Centre in the Soviet Union. Note the characteristic shape of the oscilloscope in the foreground (Dubna Photo).

Glaser (TH), Doctor A. W. Merrison (SC), Professor W. Paul (SC), and Professor C. Peyrou from the Proton-Synchrotron Division (PS)

The Conference was the 9th of its kind to be held and the first to take place in Russia. Our readers will remember the 1958 Conference on High Energy Physics was held at CERN. way), Prof. Ph. Meyer (France), Prof. R. G. Sachs (US), Prof. H. Tolhoek (The Netherlands).

Last but not least, there was still another member of our Organization who went to Russia on official business this summer : Dr. F. Farley (SC) who was in Moscow from 6 to 11 July, to attend a colloquium on cosmic rays.

## CERN in the News

As part of the celebrations connected with its Fourth Centenary, Geneva University conferred 24 new honorary doctorates.

Each faculty — the Faculty of Science, the Faculty of Letters, the Faculty of Economics and Social Science, the Faculty of Law, the Faculty of Medecine and the Faculty of Theology thus conferred four doctorates on distinguished persons.

Those awarded doctorates by the Faculty of Science were Jean Giroux, pharmocologist, Henri Humbert, botanist, Leopold Ruzicka, chemist, and Balthasar van der Pol, mathematician. It is to the latter, as may be recalled, that science owes the theory of non-linear oscillations, as well as that of relaxation oscillations. In the field of physics he originated the concept of « instantaneous frequency » and worked on the propagation of radio-frequency waves.

Professor C. J. Bakker, himself an honorary doctor of Geneva University, had been invited to represent our Organization at the very colourful ceremony which took place on June 6th last, at the Victoria Hall.

The Director-General added the tribute of CERN — whose first steps were taken under the wing of the « Schola Genevensis » — to those of institutes of learning from all over the world.

### ... and in the Press

The Press Conference held at CERN on May 27th, after the last session of the Council, resulted in a few dozen articles whose importance should not be underrated in connection with the good name of the Organization.

By the end of June our press-cutting service 'had spotted 65 reports on the proceedings of the last Council session and CERN's general activities.

Among the most interesting reports was that of David Nott in the Geneva «Weekly Tribune», which carried a first-page headline : World's Top Atomsmasher to open in Geneva».

As for Jacqueline Juillard's article in the «Gazette de Lausanne» of June 1st, it is on the whole a good example of concise, accurate and objective scientific reporting for the general public.

Finally, there was Hans Ostl's long illustrated article in the «Rhein-Neckar-Zeitung» of Heidelberg. This drew a clever parallel between the purposes of atomic energy research, on the one hand, and fundamental nuclear science, on the other. The article ended with a description of the PS and a few ideas regarding the construction of accelerators in the future.

## **Any suggestions?**

Our latest Annual Report, the one covering CERN activities for the year 1958, has been issued to you a couple of weeks ago.

Facsimile of the address presented to Geneva

University on the occasion of its 4th centenary.

Note the CERN seal - the original is blue on a

white background.

For that publication as well as for this very first vintage of our Bulletin, we seek your comments.

You don't have to sign them. If you believe you might blush in seeing your name in print in our next issue, or if modesty prevents you from being further associated with your idea, then just drop us a note « incognito ».

You may be sure your appeal will always receive due consideration, even if it is not so tender to us. Editors are—and should be—rugged people...

Do not misunderstand us. Your congratulations will also be welcomed and they will get first class treatment. Anyway, quite between ourselves, we don't expect much difficulty in selecting the entries...

One more thing. Not only should we like to have your advice but we need your cooperation as well. How? By using the attached blank to tell us about your everyday work, about the developments in your own division and, in short, about anything you believe might be newsworthy. This is important because if it is true we have ways of gathering the news and sometimes of making it, we don't know yet of reporters who come fully equipped with antennae which vibrate every time some news is in the making. You simply have to tell them.

Thank you for your help to come. Thank you also for taking the trouble of reading all this.