OLD WORLD

EUROPEAN LABORATORY

Italian Threat

THE Italian government has threatened to withdraw from ESRO unless its plans for the future of ESRIN, presented to the ESRO council at its meeting in Paris last week, are accepted. The future of ESRIN has been in the balance since it was announced last July that pure research had no part in the future of ESRO.

The hope that ESRIN can be maintained in its present form comes in a resolution submitted to the ESRO council by the Italian delegation at a meeting held on October 26. The closure of ESRIN would affect the Italians more than any other ESRO member and the threat made by Italy to withdraw from ESRO will possibly change the course of the council's action. The Italian delegation proposed that ". . . in a spirit of cooperation some of the ESRO buildings should be transferred to Italy and the remaining buildings should house ESRO work devoted to coordination and analysis of data relating to space missions in the scientific and applications field". The threat of withdrawal is made by the delegation when it continues, "It cannot, however, fail to point out that if it were impossible to reach agreement along these lines it would have serious effects on Italian participation in the organization's programmes."

The council has responded to the threat by inviting the Italian delegation to get together with the director general of ESRO, Dr Hocker, in order to set up a working party to investigate the possibility of such an arrangement. The working party is, however, working to a deadline as the proposals made in July are due to be ratified at an ESRO council meeting to be held in late November, and the council has allowed until November 15 for the working party to report on whether the proposed Italian solution is workable.

Scientists at ESRIN are unhappy about the possibility of the laboratory being split as the conditions of employment within ESRO differ considerably from conditions within Italian national laboratories It remains to be seen that if the Italian solution is the only one put forward whether it will be accepted by the ESRIN scientists.

An assurance was given at the council meeting last week that ESRIN would still be supported by ESRO until the end of 1973. An ESRO spokesman said this week that it was essential for work in progress to be completed and the present budget of $2 million would be decreased to $1.5 million in 1972 and $1 million in 1973. This can be compared with the present ESRO scientific budget of $27 million.

The staff of ESRIN is naturally embittered at the way the decision was taken to cease supporting the laboratory and this has in no way been helped by the attitude of the ESRO council that has forbidden the ESRIN director and staff members from communicating with the press. That this has irritated Dr N. D'Angelo, the present director, is shown in the following exchange of telegrams between ESRO headquarters at Paris and ESRIN. The following is the text of a message from ESRO in Paris to D'Angelo with a reply sent the following day, October 15.

"In present circumstances the directorate believes that it is preferable not (repeat not) to accord interviews. As you know the situation is still fluid and decisions on ESRIN and other parts of ESRO remain to be taken at the end of November. A full statement will be made at that time and in the meantime director general's policy is not to seek publicity or to reply to provocative articles beyond correcting gross factual errors."

The reply from D'Angelo was: "Ref. your memorandum concerning statements attributed to me. . . . Do not understand how it can be not opportune to correct gross factual errors made in attributing to me some statements which I had not made. Not in real interest of organization, quite apart from fact that my own name has been misused."

There is no doubt that ESRO headquarters in Paris are being unrealistic in hoping that the staff of ESRIN will accept their fate quietly. The scientist will not rest quietly while the door of opportunity is being slammed in his face.

NOBEL PRIZE

Father of Holography

THE 1971 Nobel Prize for physics has been awarded to Professor Dennis Gabor, of Imperial College, London. It comes as something of a surprise that the award is made for Professor Gabor's "invention and development of the holographic method" alone rather than in recognition of his broader contribution to physics. For although Professor Gabor is recognized as the inventor of holography, the technique lay dormant for more than a decade after the invention, first reported in *Nature* (**161**, 777 ; 1948). Since then, he has made significant contributions to fields as diverse as electron microscopy and cybernetics.

Born in Budapest in 1900, Gabor studied and worked in Germany until 1933, when he moved to England. The principle of holography which he developed is simple enough—an object is illuminated by a coherent electron or light wave, and the interference pattern resulting from the interaction of the secondary wave arising from the object with the strong background wave is recorded on a photographic plate. When the plate is illuminated by the strong background wave alone, the information which it contains about the object originally viewed can be extracted to give an image. As is often the case, however, it was a major step to develop practical holography from the first successful laboratory experiments.

Originally, Gabor hoped that holography would offer a new microscopic technique, because micrographs constructed using electron waves but "played back" with an optical synthesizer, should produce an image scaled up in the ratio of light waves to electron waves—some 100,000 times magnification. But this hope was unfulfilled, and the "electron interference microscope" did not then become a practical reality.

The chief difficulty with the Gabor method was the difficulty of separating the information required from a "conjugate wave" which may be regarded as attributable to a fictitious object similar in nature to the true object but occupying a different plane. With the advent of lasers, interest in holography revived because of the availability of coherent sources of optical light. But the technique remained practically unused until E. N. Leith and J. Upatnieks developed an improved wavefront reconstruction technique in the early 1960s. Leith and Upatnieks were also at the forefront of the development of three-dimensional holography.

In spite of practical difficulties, however, the basic principles of Gabor's method remain sound, and in this sense he is truly the father of holography. Indeed, the principle of the electron interference microscope has itself been vindicated. Holographic techniques have now been used by Professor George Stroke and his colleagues to improve the resolution of electron micrographs to 2.5 Å, revealing the internal structure of a virus (*New Scientist*, **51**, 671 ; 1971).

Extract from D. Gabor's original letter describing the technique now known as holography:

". . . the arrangement is similar to an electron shadow microscope ; but it is used in a range in which the shadow microscope is useless, as it produces images very dissimilar to the original. The object is preferably smaller than the area which is illuminated in the object plane, and it must be mounted on a support which transmits an appreciable part of the primary wave. The photographic record is produced by the interference of the primary wave with the coherent part of the secondary wave emitted by the object. It can be shown that, at least in the outer parts of the diagram, interference maxima will arise very nearly where the phases of the