Other transport effects. In this field a large amount of detail has been filled in, and some was reported at the meeting, on both the older and the newer semiconductors. The main Russian contribution may be mentioned here, namely, to direct attention again to the low-mobility semiconductors (A. Joffé, Leningrad), which may raise fundamental problems. For example, if the mean free path of electrons is of the order of: $l = 10^{-8} \sqrt{(m_e/m)v}$ cm., where v is the mobility and m_e the effective mass of electrons, then l is less than atomic distances for $v < 10$ cm.^{2}/volt-sec., and therefore ceases to have a meaning. The concept of energy-bands itself may become inapplicable. Impurity scattering and mobility theory would both require extensions for this class of substances. The view was also expressed that the change of electrical properties during melting suggests that the zone structure of solids depends only on short-range order. Great difficulties, however, stand in the way of understanding disordered structures, to which a paper by C. Domb *et al.* (London) was devoted.

Substances which exhibit impurity-band conduction present some features of a disordered low-mobility system, but little progress in the understanding of this phenomenon appears to have been made, though interesting papers on this topic were presented at the meeting (germanium, H. Fritsche, Chicago; silicon, T. Longo *et al.*, Purdue; InSb, R. J. Sladek, Pittsburgh).

Low-temperature photoconductivity in silver halides was described by J. W. Mitchell (Bristol) and F. C. Brown (Urbana).

Bonds. In connexion with the renewed attempt to look beyond the band picture, a number of substances have been studied recently the properties of which may possibly be more readily understood in terms of some chemical-bond picture. A curiosity among these is the compound AuCs, with two elements of the first group, which is a large-gap ($E_g \simeq 2{\cdot}9$ eV.) semiconductor (W. E. Spicer and A. H. Sommer, Princeton). Also of interest are the $A^{III}\,B^{VI}$ compounds from the third and sixth group (for example, GaTe), which have been investigated by E. Mooser *et al.* (Ottawa). These are semiconductors although they have nine valence electrons per anion, that is, one more than is normal in such semiconductors.

Bands. There was at the 1956 meeting an almost complete absence of energy-band calculations[1], but this was not true of the 1958 meeting. Several American workers have recently reconsidered the status of the one-electron approximation, and W. Kohn (Pittsburgh) spoke on the justification of the one-electron effective-mass approximation from the many-electron Schrödinger equation. The effect of a magnetic field may require further consideration here. The use of potential operators in band calculations was also discussed. Particularly the $\mathbf{k} \cdot \mathbf{p}$ approach (E. O. Kane, Schenectady) has in recent years proved very useful, though it was suggested by J. C. Philips (Bell Telephone Laboratories) that rather large corrections may be required. Band forms discussed at the meeting included ZnS (J. L. Birman, Bayside), InAs (F. Stern, Silver Springs), GaAs (R. Braunstein, Princeton), apart from silicon and germanium.

Surfaces. There has been steady consolidation in this field, which was surveyed by A. Many (Jerusalem). The distinction between fast and slow states appears to remain useful, and the origin of the fast states is still not understood, though they are believed to reside in the transition region from the bulk material to the surface oxide. The time-lag which usually exists before experiments on the bulk material are attempted for a restricted part of the surface layer is, however, shortening, and optical, magnetic and transport properties of surfaces were discussed (for example, by J. N. Zemel and R. L. Petritz, Silver Springs). The adsorption on germanium and silicon appears to follow a logarithmic rate law (S. Wolsky, Waltham), familiar in oxidation and chemisorption studies. Reproducible 'clean' ('Farnworth') surfaces can be produced by ion-bombardment or heating techniques, and these have now become standard procedures.

The meeting closed with a very useful summary session, in which L. Apker, W. H. Brattain, H. Brooks, C. Herring and D. Polder took part, and one may express the hope that this will become an increasingly important pattern of future meetings. The proceedings will be published early in 1959 in the *Journal of the Physics and Chemistry of Solids*, and the next meeting will probably take place in Prague in 1960.

P. T. LANDSBERG

[1] *Nature*, **178**, 1156 (1956).
[2] *Proc. Roy. Soc.*, A, **188**, 521 (1947).

THE EUROPEAN NUCLEAR ENERGY AGENCY

UNDER the title "The European Nuclear Energy Agency and the Eurochemic Company*, the Organization for European Economic Co-operation has published the first report of its Steering Committee for Nuclear Energy. It includes the Statute for the European Nuclear Agency, which the Committee recommends the Council should adopt, as well as two draft conventions, one on the establishment of security control in the field of nuclear energy and the other on the constitution of the European Company for the Chemical Processing of Irradiated Fuels (Eurochemic). The former is to be recommended to member governments for signature and the latter is to be submitted for signature to the governments interested. Amendments to its Statute are also proposed by the Study Group for the Chemical Processing of Irradiated Fuels and authorization is requested for expenditure by the Study Group of 500,000 European Payments Union units of account. The Study Group also recommends that the proposed plant should be located at Mol in Belgium, but if it were decided later to construct a large plant the most suitable site is considered to be that proposed by Norway. The present plant is estimated to cost

* Organisation for European Economic Co-operation. European Nuclear Energy Agency and the Eurochemic Company. First Report of the Steering Committee for Nuclear Energy to the O.E.E.C. Council. Pp. 192. (Paris: Organisation for European Economic Co-operation, 1958.) 750 French francs; 12*s.*; 2 dollars.

12 million E.P.U. units of account and, including research, would require a staff not exceeding 400–450.

The Steering Committee expects shortly to submit proposals for the joint construction or operation of two experimental reactor projects (boiling water reactor and homogeneous aqueous reactor) and is also to report shortly on the measures at present under discussion for liberalization of international trade. It is also to submit proposals regarding training, and particularly the assistance to be given to universities and higher technical colleges of member countries for training specialists; health and safety, particularly the examination of projects for the discharge of radioactive waste, the evaluation of reactor hazards, and the international transport of highly radioactive materials; and liability and transport, particularly the drawing up of common rules concerning third-party liability in the nuclear field. Annexes to the report include a general description of the recommended processing plant, the text of the proposed conventions and the amended Statute of the Study Group, as well as the proposals of the working groups on experimental reactors and on nuclear power stations for their co-operative development in Europe. There is also a summary of the national programmes for building nuclear power stations in Austria, Belgium, France, Western Germany, Italy, the Netherlands, Sweden, Switzerland and the United Kingdom.

On the basis of this report, the Council, on December 17, 1957, adopted the Statute of the European Nuclear Energy Agency, and the International Convention on Security Control was signed by member countries of the Organization for European Economic Co-operation on December 20. The text of this Statute and the Convention (see *Nature*, 181, 952; 1958) are also appended to the report, which, with the details of membership of the study groups, working groups and working parties and of the Steering Committee itself, is a particularly useful reference document on the present development of nuclear energy in Europe.

THE TASMANIAN MUTTON-BIRD

THE Tasmanian mutton-bird, *Puffinus tenuirostris* (Temminck), is known to ornithologists as the short-tailed or slender-billed shearwater, and was known to the Tasmanian aborigines as 'yolla' and to the white seafarers of Bass Strait as the 'yowler'. Historically it is recorded earlier than white settlement of Australia; sociologically it has importance as the only example of commercial wildfowling successfully surviving in Australia and in being the mainstay of that interesting community, the Cape Barren Islanders; scientifically, it amazes naturalists through the astonishing regularity of its breeding time-table, its widespread migration and its uncannily accurate homing each year to its exact nesting site. It also occurs in such abundance that it could quite well be Australia's most numerous bird. An interesting account of the bird has been prepared by D. L. Serventy*.

Puffinus tenuirostris is a long-lived bird, and, for its size, has an unusually lengthy period of sexual immaturity. Female birds begin to breed at 5–7 years of age and males at 7–8 years. Immature birds do not make a landfall, once they leave their natal islands as fledglings, until they are 3–4 years of age.

The sexually mature, breeding birds return from their migration to the nesting islands in the last week of September, and by then gametogenesis is well advanced. Burrows are actively scratched out, and vocal performances enliven the rookeries at night. Though egg-laying does not begin until the third week in November, a striking behavioural change occurs at the beginning of November. The birds vacate the islands entirely, and do not return again until the onset of egg-laying.

The exodus follows immediately after fertilization, and the birds leave for the open sea while the single very large egg matures (it weighs about 85 gm. and is about 16 per cent of the female's body-weight). Though this pre-egg-laying exodus was known in the Tasmanian mutton-bird from early times, it was not detected in other petrels until comparatively lately.

* *Aust. Mus. Mag.*, **12**, No. 10 (June 15, 1958).

Egg-laying starts about November 20–22 and ends about November 30–December 2. The calendar is invariable from year to year and from rookery to rookery, though these are spread through eleven degrees of latitude—from near Ceduna, in South Australia, to southern Tasmania—adjacent to seas which differ widely in temperature, chemical composition and currents. Year-to-year variations in the local sea conditions, or the weather, have no influence on the breeding calendar, which is the same now as when the earliest observers wrote their accounts more than a hundred years ago. This surprising constancy has yet to be fully explained.

When the birds return to their nesting islands for the egg-laying the male gonad has dwindled drastically in size, and the seminiferous tubules are in a state of fatty metamorphosis. No other avian species shows a more rapid collapse of the testis, though this may be characteristic of the petrel group. When the egg is laid, the female departs to the sea to recuperate.

The newly hatched chick is rarely tended continuously by the parents for longer than two days and is then left alone by day. Both parents share in the feeding, which takes place at intervals, and the young bird may have to undergo lengthy fasts of several days between Gargantuan banquets of krill. The growth-rate is rapid and the fledgling may come to exceed the weight of a large adult in little more than a month after hatching. The young birds emerge from the burrows at night, vigorously exercise their wings and at length make their own departure from the natal islands. This exodus of the fledglings usually occurs from the third week in April to the first week in May.

The nature of this migration has long been a matter of speculation. Some ornithologists were loath to believe that the birds in the northern Pacific could be of the same breeding stock as the Australian birds. The first ornithologist to suggest that the north Pacific birds were Australian birds on migration was A. J. Campbell. It was only in 1955