active and semi-active volcanoes. An earthquake with epicentre some two miles south-east of Rabaul (New Britain) occurred on May 7, 1919, in the neighbourhood of the semi-active volcano Glaie or Tavurur. One previous to this was on January 1, 1916. The line of disturbance is south-west from the volcano Glaie to the large active volcano called the Father on the north coast of New Britain. Earthquakes appear to be most severe when the Father is quietest. The line extends then westerly towards the west end of New Britain, where there are semi-active volcanoes; thence on to the island of Manam off the coast of New Guinea, where there is a very active volcano. The present seismic activity appears either to be on another branch of this line of activity, or along a westward extension of the line.

Earthquake in the Philippines

AN earthquake of considerable severity was registered at both the Riverview and Perth Observatories in Australia on April 9 early in the day. At Perth the seismograph pendulum boom swung five inches, and at Riverview the seismograph showed earthquake waves passing the observatory for four hours. It was tentatively suggested that the earthquake might have had its epicentre under the sea south-west of Luzon in the Philippines.

Rainfall Flooding and Health

A CHADWICK Lecture under the Bossom Gift was given on April 14 by Mr. D. C. Graham, who discussed the dangers from rainfall in urban areas, the prevention of flooding of buildings and of its insanitary consequences. Mr. Graham dealt with the subject under four headings: (1) faulty design of buildings and omissions of essentials; (2) overflowing of streams and rivers; (3) damp and flooding by land water; (4) backing up of rainwater in drains and sewers. The first two causes were touched on and the two last discussed in detail. Reference was made to the importance of the building by-laws in this connexion and to the necessity of careful inspection and repair of river walls. As regards the third cause, there is considerable difficulty in ascertaining in dry weather whether a building site will remain dry and whether there are any land drains or filled-in ditches that will cause dampness or flooding after heavy rain. The varying levels of the land water due to drought, pumping near the site and to wells and the great importance of constructing the lowest floors of building either above the maximum water level or making the walls and floors waterproof and of sufficient strength, were dealt with, as well as the laying of sub-soil drains near a building, and what they should and should not do. It is not practicable for financial and other reasons to provide sewers of sufficient capacity to carry away the heavy rainfalls that occur from time to time, especially during thunderstorms, as rapidly as they fall, and there are a number of unknown factors, such as the storage capacity of the sewers and drains and the fact that during a storm the flow in the sewers may be backwards as well as forwards, which prevent precise calculations being made. Where it is necessary to construct basements with floors below the possible flood level in the sewers, there are advantages in not draining such basements; where such basement drainage is required in old or new buildings, the risk of flooding can be reduced to a minimum at no great expense.

Freshwater Fish Farming

THE Freshwater Biological Association of the British Empire has just published a pamphlet on the "Production of Freshwater Fish for Food" by Dr. T. T. Macan, Dr. C. H. Mortimer and Dr. E. B. Worthington (Freshwater Biological Association, Wray Castle, Ambleside, Westmorland, Sci. Pub. No. 6, pp. 36. Price to non-members 1*s.* 6*d.*) Fresh water covers about 340 square miles in England and Wales and about a similar area in Scotland. The total area is, therefore, comparatively small; but in war-time these inland waters should not be neglected since they can yield crops of food at the cost of little labour. The chief aim of the pamphlet is to make available some of the methods, especially those involving the use of manures, by which crops of fish from fresh water can be increased. The most suitable fish for stocking ponds are carp (*Cyprinus carpio*), tench (*Tinca tinca*) and rainbow trout (*Salmo irideus*). Other freshwater fish are considered, though most of them are unsuitable for rearing in ponds. Perch, for example, tend to become too numerous, and a method of perch trapping is described in the pamphlet (see also NATURE, **148**, 651; 1941). Improvements in eel fishing are also discussed. Other topics considered in the pamphlet are: the food chain in natural waters, productivity of natural waters, methods of increasing productivity, pond management and construction, stocking and cropping, lay-out of a carp farm, sewage fishponds. Anyone possessing a pond or concerned in any way with areas of fresh water of reasonable size should obtain a copy of this pamphlet.

Air-raid Damage and Electricity Supply

IN its issues of March 13 and 20, the *Electrical Review* publishes the results of a works investigation by E. A. Beavis of cable breakdowns due to bomb damage and the resulting short-circuits, the implications of which, on a cable of comparatively small cross-section, seem to warrant careful consideration by power distribution engineers (see also NATURE of February 7, p. 173, and March 28, p. 362). This cable, having an area of 0·023 sq. in., was insulated for 11 kv. and provided with a B.O.T. sheath and a lead sheath which was double steel-tape armoured and served. It had operated since 1926 on a 6·6 kv. system. During a severe raid, a bomb explosion damaged the cable at a point 708 yd. from the main sub-station and also a 0·10-sq. in., 3-core, 6·6 kv. cable running close by along the same route. The switch controlling the 0·023-sq. in. cable did not trip, although the 0·10-sq. in. cable was tripped out on short-circuit protection. Excavation disclosed damaged places in the 0·023-sq. in. cable at five points within a distance of about 150 yd. from the main sub-station. The faults were cut out and removed for examination. With the exception of No. 5—the farthest from the station—all the failures showed similar characteristics and in appearance were more like bursts or blow-outs than true electrical faults.

At fault No. 5 the cable had burst completely, one steel tape only holding the parts together. At the break, the conductor strands showed signs of fusing, while the lead sheath also had been partly melted; a short-circuit had evidently occurred at this particular spot. From the collected evidence, it seems that two distinct breakdowns occurred, the first of which was at the crater caused by the explosion and

the second at fault No. 5. From a consideration of the circuit conditions prevailing it was concluded that from the very outset the 0·023-sq. in. cable was too small to be able to deal with the large fault kva. capacity available—approximately 260,000 kva. at the main sub-station. A factor contributing largely to the excessive damage occasioned was the comparatively long time-delay in the switch tripping arrangements; with a minimum relay setting of practically 0·9 sec. and a switch action taking 0·4 sec., the total clearance time was almost 1·3 sec. Had this operation been much quicker, say 0·4 sec. or less, the temperature would not have reached 200° C. and the deterioration in the cable would not have been excessive. The second part of the article gives a theoretical study of the factors involved in co-ordinating cable size with system characteristics from the point of view of the large fault kva. likely to be experienced.

Bio-Physics in the United States

THE growing importance of bio-physics is recognized in a new feature of the *Review of Scientific Instruments*, published by the American Institute of Physics. Starting with the new volume, 13, the scope of the journal is enlarged to include physical instruments useful in biological research. In the issue dated January 1942, Detler W. Bronk discusses physical instruments for the biologist. Reference is made to the outstanding work of Helmholtz, Keith Lucas and A. V. Hill in the combined fields of physics and biology. Progress in the physical sciences is soon reflected in the advance of biology and medicine. As these sciences become more analytical, more revealing methods of observation, more precise instruments for measurement and more accurate means for the control of experimental conditions are needed. Investigators have extended their large-scale analyses down to the small scale of the activity of the cellular units of the organism and their molecular structure. This requires extraordinary sensitivity and high resolving power in the instruments. Furthermore, some of the phenomena occur with great rapidity.

One of the great faults of extreme specialization lies in the tendency to produce journals of similar extreme specialization, so that workers in the restricted field need 'waste' no time in reading outside their subject. As a result they are often ignorant of fields where their own specialized knowledge would be of the greatest help. The danger is very great in biophysics. Whereas every medical student must spend a part of his time studying physics, it is quite unusual for the physicist ever to have studied biology. Time-tables in universities often prevent a student including one of the biological sciences in a course involving both physics and mathematics. The new development, by which papers on biophysics will be included in a journal devoted to general physics, will prove unusually valuable in directing the attention of physicists to a new field containing problems of which many may be quite unaware. The first three papers in the new section deal respectively with an analyser for 1 c.c. of respiratory gas, with volumetric microrespirometers capable of an accuracy of the order of 1/100 mm.^{3} an hour and with an electrical capacitance diaphragm manometer for direct pressure measurements in the arterial blood stream. This latter instrument uses a radio-frequency, crystal-controlled oscillator and a pressure-sensitive condenser in the pick-up unit.

The Direct-Current Amplifier in Industry

IN a paper read before the Institution of Electrical Engineers on March 6, D. C. Gall describes the design and behaviour of a direct-current amplifier, entirely alternating-current mains-operated, and having an accuracy independent of mains' fluctuations or change in valve characteristics. The voltage to be amplified is applied to a reflecting galvanometer in series with a resistance. The light from the galvanometer strikes a photo-cellwhich controls the grid voltage of a thyratron valve, this voltage shifting according to the illumination of the photo-cell. The grid voltage makes the thyratron conducting between its anode and filament circuit for part of the positive half-wave and, as the phase of the grid voltage advances, the conducting period lengthens, giving a larger effective rectifier current output. This current is fed back through the resistance so that the voltage drop opposes the applied voltage, the drop rising until the input voltage is balanced. Output current is thus proportional to input voltage. The thyratron anode current is supplied from a 250v.-section of the mains transformer and it operates the amplifier output circuit apparatus. Smoothing condensers and inductances convert the thyratron unidirectional current pulses into steady direct current and suppressing circuits eliminate radio interference from these pulses. The amplifier has an output of three watts and a power gain of about 10^{10}. It can be used as a voltage- or current-amplifier and is extremely stable. It has been applied to high-speed temperature-recording of liquid steel, to the metering of heat transport in large hot-water plants, to optical pyrometry, measurements of illumination by barrier-layer type photo-cells, to the polarograph and to many other problems in which very small E.M.F.'S are available as a function of the quantity to be measured. The departure from linearity of response is of the order of only a few parts in 10,000, and voltages of a few microvolts and currents as low as 0·01 microamp. can be amplified and thus used to operate recorders and controllers.

Uses of Laminated Densified Wood

AN article by A. E. L. Jervis in the *Electrical Review* of March 27 describes the insulating properties and tooling applications of the so-called densified woods. In contrast to the mechanical shortcomings of solid wood, the laminated densified varieties are very strong and can be good electrical insulators, resisting corrosion and acid as well as moisture absorption, in which respect those produced under greatest pressure with the largest resin impregnation content appear to afford the best results. They can be substituted for metals, being more suitable (one sixth the weight of steel) in some cases, easier to machine and modify, and more quickly produced in a variety of thicknesses and shapes, so lending themselves to mass fabrication. Laminated densified woods can have tensile strengths up to 34,000 lb. per sq. in. and compressive strengths between 18,000 and 30,000 lb. per sq. in., depending upon veneer orientation with respect to the direction of the wood grain. Fanwise arrangement of the veneer laminations is suited to the manufacture of circular articles; 45° stacking is a simplification, and a 90° arrangement is the standard for material used for aircraft tool-making.

Two varieties are made by Moulded Components (Jablo), Ltd., both being produced hot under pressure.