PLECOPTERA

New Australian Species

LIKE mayflies, stoneflies (order Plecoptera) pass through an aquatic nymphal stage commonly found in streams and rivers, particularly those with stony or gravelly bottoms. Of the nine or so families in the order, one, the Gripopterygidae, is found only in Australia, New Zealand and South America (though there is also

one doubtful record from Fiji). Twenty new Australian species have now been added to the family list by I. D. McLellan who, in a revision published in the *Australian Journal of Zoology* (Suppl. No. 2; 1971), describes the new types which include the new genus and species *Neboissoperla alpina*. The larva of this species, shown here, was found in a small stream on Mt Wellington, Victoria.

COMPACT GALAXIES

Gamma Rays from 3C 120

from a Correspondent

AFTER the discovery of the first γ -ray star by Frye *et al.* (*Nature*, **223**, 1320; 1969), it seemed inevitable that somebody would eventually find γ -rays from discrete sources located outside our own galaxy. Surprisingly, the first extragalactic γ -ray emitter has been tracked down by a group of engineering physicists in the Soviet Union, who have just announced that the compact galaxy 3C 120 is a powerful source of 100 MeV photons. With this spectacular advance, the mystery of variable radio galaxies (see *Nature Physical Science*, **231**, 22; 1971) deepens yet further.

Unlike X-ray astronomy, γ -ray astrophysics is taking several years to build

up momentum, and there have been few big discoveries. Now that increasing emphasis is attached to satellite-borne telescopes permanently aloft, the pace will almost certainly quicken. The γ -ray observations of 3C 120 were in fact conducted with special equipment flown on the Cosmos 251 and Cosmos 264 satellites. These two probes are designed to make a slow rolling scan of a narrow band of sky on each orbit of the Earth. When S. Volobuev, A. Gal'per, V. Ugryumov, B. Luchlov, and Yu. Ozerov (Moscow Engineering Physics Institute) came to analyse the results, they found that some of the scans gave an enhanced count in a certain zone of the sky (*JETP Lett.*, **13**, 28; 1971), and they adduce this count of celestial γ -rays in excess of the background as evidence for a discrete source. The count rate is about one photon at 100 MeV or higher every 90 s, and this is ten times the rate for Sgr γ -1, the discrete galactic source.

Unfortunately, the precision of the positional information is rather poor, and they can only locate the source in a box 20° by 5° ; this is the stage that radio astronomy reached in the late

1940s. All is not lost, however, because the violently variable galaxy 3C 120 lies in the very centre of the error box. Furthermore, the γ -rays were detected at a time when the radio flux density measurements indicated the presence of a vigorous outburst of energetic activity. Finally, the measured γ -ray flux of 2×10^{47} ergs per second agrees beautifully with a prediction for 3C 120 made by the distinguished Soviet theoretician Iosif Shklovskii.

The theorists should now have plenty of fun because 3C 120 has been extensively observed in the radio and visible regions. A fundamental question is the nature of the γ -ray emission mechanism. One possible process is the inverse Compton effect, in which high-energy electrons scatter their own synchrotron radiation into the γ -ray spectrum. Here the snag is that the energy losses in the electron spectrum proceed at a catastrophic rate, so that the supply of relativistic electrons is rapidly exhausted. On the other hand, it is possible that relativistic energy is reinjected during the annual outbursts of 3C 120 and thus keeps the fires burning.

Insulin Activates Pyruvic Dehydrogenase

THE report by R. M. Denton and associates in next Wednesday's *Nature New Biology* that insulin may directly stimulate the activity of pyruvic dehydrogenase in adipose tissue is yet a further piece of evidence that not all effects of insulin are explicable by some primary stimulus to glucose metabolism. The Bristol group incubated rat adipose tissue with low concentrations of insulin and found a consistent stimulation of pyruvic dehydrogenase activity with glucose or fructose in the incubation medium. Stimulation also took place in the complete absence of any substrate. Such results may well explain that the known very high rate of glucose transport into adipose tissue (which would be expected to be stimulated by insulin) is not by itself great enough to account for the increased synthesis of fat. Control of fatty acid synthesis from glucose by insulin would then be exercised both at the cell membrane level as well as at a later key point in glucose metabolism, involving the fate of pyruvate.

Though it is fifty years since insulin was discovered, there is still widespread disagreement and argument about its mechanism of action. Because it was the simplest parameter of insulin action to be measured, its lowering effect on blood sugar levels was for a long time thought to be fundamental to all its other effects. In the past few years, however, it has been shown that several of the other metabolic activities of insulin apparently do not depend on glucose

metabolism for their expression. Such effects include the release of fatty acids from adipose tissue, as well as the important stimulatory effect of insulin on protein synthesis.

How then can these diverse modes of insulin action be explained on any unitary hypothesis? Some of the effects of insulin certainly seem to involve a depression of cyclic AMP levels following exposure of these tissues to insulin, as seen in liver tissue where depressed levels of cyclic AMP seem to depress glycogen phosphorylase and stimulate glycogen synthetase very soon after its administration. Such enzymes exist in two forms, a phosphorylated and a dephosphorylated form, and phosphorylation involves the activity of a cyclic AMP activated kinase. It is of especial interest therefore that two forms of pyruvate dehydrogenase have now been reported to exist in some tissues by Lin and his co-workers (*Proc. US Nat. Acad. Sci.*, **62**, 234; 1969). Once again one form of the enzyme is phosphorylated and the other nonphosphorylated.

Though it might be very tempting therefore to ascribe the effects of insulin on this enzyme to a cyclic AMP mediated phosphorylation, Denton *et al.* report in another communication (*Proc. Biochem. Soc.*, in the press, 1971) the lack of a direct effect of cyclic AMP on the dehydrogenase enzyme. Further work on the mechanism by which insulin stimulates pyruvate dehydrogenase will now be awaited with great interest.