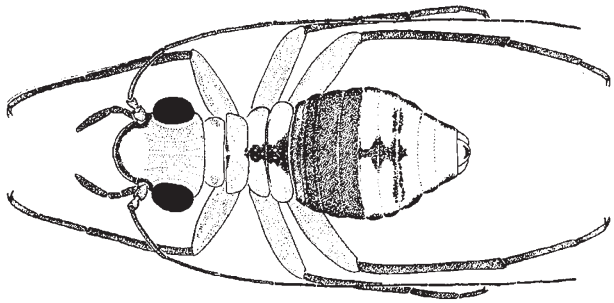
of low molecular weight might be responsible for the yellow stain, possibly in clouds which are composed of ice particles.

ENTOMOLOGY

Another Louse

THIS larva of an African louse, which is 1·3 mm long, has been assigned to the species, *Epipsocopsis cincta*, by A. Badonnel in a study of the Psocoptera, or lice, of Angola and neighbouring countries. It appears in one of the lavishly produced publications from the Museum at Dundo in Angola (Companhia de Diamantes de Angola, *Publicaçoes Culturais*, No. 79; 1969). The material for this study was a collection made by A. de Barros Machado and his colleagues, and Badonnel identified 2,220 adult lice.



TUMOUR VIROLOGY

Chasing a Minus Strand

from our Cell Biology Correspondent

WORKING up an experimental system to the point at which it can be used to answer interesting questions is a job most people prefer to leave to someone else, and tumour virologists, especially those who aspire to molecular biology, are no exception. Today it is simpler, and more immediately rewarding, to work with DNA tumour viruses, polyoma and SV_{40}, than to work with the RNA tumour viruses even though, as far as the viral aetiology of cancer is concerned, RNA tumour viruses seem to be the more pertinent of the two groups.

The RNA tumour viruses unfortunately present daunting technical problems. For one thing they have too much genetic information to make analysis of gene functions straightforward and for another they wrap themselves up in a large amount of host cell lipoprotein, which can comprise more than 99 per cent of the total mass of the virions. But in spite of their apparent complexity the RNA tumour viruses may prove at bottom to be very similar to the simplest of all viruses, the RNA bacteriophages. And certainly the RNA phages and small non-oncogenic RNA viruses, such as polio virus, are still valuable models for the RNA tumour viruses.

No one will be surprised, for example, if the replication of the single stranded RNA genomes of the tumour viruses proves to follow the same pattern as replication of the RNA phage and polio genomes. Several groups are busily searching for a tumour virus-specific RNA replicase similar to the well characterized Qβ phage replicase, and Watson and Beaudreau (*Biochem. Biophys. Res. Commun.*, **37**, 925; 1969) have made some progress in this direction. They have isolated a crude enzyme fraction from blood cells of chicks infected with avian myeloblastosis virus which may well contain the virus replicase. The crude enzyme preparation is not template-specific for the virus RNA, although of the several RNA templates tested avian myeloblastosis viral RNA was most effective; the RNA made with the virus RNA as template has yet to be characterized and the amount of RNA made is much less than the amount of template added. Nevertheless, the preparation probably contains the viral replicase, and although Watson and Beaudreau have a long way to go to prove that, the properties of their extract parallel in many respects the properties of crude extracts of Qβ phage replicase in the early days of its characterization.

If RNA tumour virus replication is similar to replication of other single stranded RNA genomes a minus strand complementary to the plus strand in the virion should be made during replication. Biswal and Benyesh-Melnick (*Proc. US Nat. Acad. Sci.*, **64**, 1372; 1969) have claimed recently to have detected such a minus strand in rat cells infected with murine sarcoma–leukaemia virus. They find, after extraction by a phenol–*m*-cresol procedure which could be the secret of their success, two RNA species restricted to the nuclei of infected cells. These sediment at 31–36S and 18–22S and, after heat denaturation, hybridize with RNA from murine sarcoma–leukaemia virions. On the other hand, none of the RNA from the cytoplasm of infected or uninfected cells, or the nuclei of uninfected cells, hybridizes with virion RNA. Biswal and Benyesh-Melnick conclude that the 31–36S and 18–22S RNA species are minus strands or fragments of minus strands, which presumably act as templates for synthesis of progeny virus genomes. The smaller of these two RNAs, the 18–22S RNA, is, moreover, resistant to ribonuclease and therefore probably double stranded. It may be part of a replicative form, but if so it is surprisingly small.

On the face of things these results are precisely as anticipated—the fact that only about 22 per cent of labelled virion RNA hybridizes even with large excesses of nuclear RNA may be a technical artefact—and the way seems open for the characterization of tumour virus RNA replication.

BIOCHEMICAL THERMODYNAMICS

Counting the Calories

from our Molecular Biology Correspondent

THERE is, of course, nothing new about the use of calorimetry to follow chemical and even biochemical processes. Nonetheless, all the indications are that this technique has only just arrived so far as molecular biology is concerned, and that it will not be long before the present trickle of papers becomes a flood. This growth of interest must be presumed to be at least partly a consequence of the development of good commercial instruments, which have gone some way to making the method experimentally foolproof. Two papers in the current literature—both in fact by long-standing practitioners of the art—illustrate well the scope of microcalorimetry in the study of enzymes.

Shiao and Sturtevant (*Biochemistry*, **8**, 4910; 1969) have studied the interaction of chymotrypsin with its inhibitors, and its dependence on protein concentration. In the first place, the heat of dilution of chymo-