experiments which show that the conversion *in vitro* of single-stranded φX174 DNA to the double-stranded replicative form depends on the presence of the four ribonucleoside triphosphates, is inhibited by small amounts of actinomycin D and involves the covalent linkage of DNA to an RNA primer. The conversion is not, however, inhibited by rifampicin or by streptolydigin, both antibiotics which not only block RNA polymerase but also prevent the initiation of replication of the single-stranded DNA of coliphage M13. Precisely what enzyme, or what form of the classic RNA polymerase of *E. coli* synthesizes the RNA primer involved in initiating the replication of φX174 DNA, even in the presence of these two antibiotics, remains an intriguing question. The roles in the replication of the DNA of these two phages of the products specified by the genes *dnaA* and *dnaB* of the host cell also pose an interesting and unsolved question. Kornberg's group suggests that both *dnaA* and *dnaB* gene products are required for the initiation of replication of φX174 DNA, but are not required for the replication of M13 DNA. The experiments reported by Hofschneider and his colleagues (*ibid.*, 2570) suggest, however, that a functional *dnaB* gene may be required for replication of M13 DNA.

SPACE MEDICINE

Acclimatized Rats

from our Soviet Correspondent

EXPERIMENTS carried out in the Tuya-Ashu pass in the Tien Shan Mountains indicate that, following acclimatization at a little more than 3,000 m above sea level, the altitude ceiling of resistance to hypoxia may be increased by more than 1,000 m to some 15,000 m (*Kosmicheskaya Biologiya i Meditsina*, **6**, No. 4; 1972).

The experiments were carried out on albino rats weighing between 160 and 180 g. Control experiments were carried out in Frunze (altitude 771 m). Two series of tests were performed: in the first, six groups of ten animals were used and the altitude ceiling was established on the third, seventh, fifteenth, thirtieth, forty-fifth and sixtieth days of acclimatization; in the second series, four groups of ten rats were kept for fifteen, thirty, forty-five and sixty days at the Tuya-Ashu station, and then returned to Frunze, where they were tested for resistance to hypoxia on the third, tenth, twentieth, thirtieth and fortieth days after return. All tests were carried out under identical temperature conditions (18–20° C), and the "ascent" was simulated in a pressure chamber at a rate of 16.6 m s^{-1} with a pause of 5 min after each additional 1,000 m of "height". The test was terminated immediately respiration ceased.

The control experiments in Frunze gave an altitude ceiling of 13,700 ± 324 m. Following transfer to Tuya-Ashu, the altitude ceiling at first decreased (to 13,250 ± 397 m on the third day) and then increased, the maximum resistance to hypoxia being observed on the forty-fifth and sixtieth days (altitude ceilings of 15,200 ± 265 m and 15,000 ± 397 m respectively). The results for the thirtieth day (14,750 ± 397 m) indicate, however, that by this time the physiological changes involved in acclimatization had taken place. On return to lower altitudes, the duration of the increased resistance depended on the period of acclimatization; the effect of acclimatization for 45 to 60 days lasts for more than 2 months, whereas that of acclimatization for 15 to 30 days lasts only for 20 to 30 days and by the fortieth day has decreased to virtually that of the control experiment.

MOLECULAR BIOLOGY

More Uses for Neutrons

from a Correspondent

A NEW method involving neutron scattering has been proposed for the determination of biological quaternary structure (Engleman, D. M., and Moore, P. B., *Proc. US Nat. Acad. Sci.*, **69**, 1997; 1972).

It is about ten years since the three-dimensional arrangement of a protein molecule was first determined; now the number of such known structures is counted by the dozen and interest centres not so much on the structure itself as on the biological mechanisms which it might explain. These molecular structures could be determined because the protein molecules crystallized, that is arranged themselves on a three-dimensional lattice. It was then possible, by the techniques of X-ray crystallography, to determine the structure of the occupants of the lattice points. Interest is now growing in the question of how these biological macromolecules, such as proteins, interact with one another in ordered aggregates (quaternary structure) to produce biological systems such as ribosomes, membranes and muscle. Such large scale aggregates do not always crystallize readily, and it is obvious that unless these biological systems are themselves to some extent crystalline—fortunately various animal frameworks and muscle are—it is not possible to apply diffraction techniques so readily, and the task of determining molecular arrangement *in vivo* can become very difficult.

The new method depends on the physical basis for neutron scattering. X-rays are scattered by the electron clouds surrounding the atomic nuclei, and so the result of a structure determination by X-ray crystallography is a contour map of electron density. An important method for solving molecular structures by X-ray crystallography is to introduce a heavy atom into the molecule; the large number of electrons associated with this atom then dominate the X-ray scattering and the position of the atom is readily found. Neutrons, on the other hand, "see" the atomic nuclei, and neutron scattering is not simply related to atomic number.

Inside Cool Interstellar Clouds

FROM an examination of the radio frequency recombination lines in the direction of the interstellar cloud W3A it is possible to make some conclusions about conditions in interstellar space. This study is reported in next Monday's *Nature Physical Science* (October 9) by E. J. Chaisson of Harvard College Observatory. Chaisson has used the 140-foot aerial of the National Radio Astronomy Observatory to examine the 18 cm signal from the direction of W3A. The interesting features that Chaisson describes are a number of recombination lines which are superimposed on the continum radiation emitted by the HII region associated with W3A. The recombination lines are presumed to arise from cooler, partially ionized concentrations situated somewhere along the line of site between W3A and the Earth.

In his article Chaisson reports the detection of recombination lines of excited hydrogen and carbon, and a line attributed to so far unidentified elements of intermediate mass. By examining the widths of the lines he can, of course, obtain some measures of the temperatures and amount of turbulence within the cloud. Chaisson then goes on to discuss what conditions in the clouds are likely to allow the coexistence of the *mélange* of radio frequency lines which are observed in that direction. One possibility is that the outer parts of the cloud shield the inner regions so that conditions are suitable for the existence of a variety of molecules and ionized atoms. And Chaisson speculates that if the line attributed to the superposition of emission from several unidentified elements can be disentangled, the line might give valuable information about the relative abundances of the elements in these cool clouds. But this possibility seems to depend more on the amount of turbulence within the clouds than on questions of instrumental resolution. It may be that the only differentiation that can be made will be the separation of iron from other species.