

THE IMPERIAL CANCER RESEARCH FUND

THE fifty-sixth annual report of the Imperial Cancer Research Fund*, for 1957-58, describes the lines of investigation in progress in the laboratories at Mill Hill and Lincoln's Inn Fields. They can be sub-divided as follows:

(1) *Tumours induced by viruses.*

Work continues on the virus aetiology of cancer by studying the mechanism whereby the virus gains access to the cell it infects, the virus's mode of replication and its specificity. Attempts are being made to grow the mouse leukaemia-inducing virus in tissue cultures of embryo fibroblasts, and by reciprocal transplantation experiments to find "whether the cellular elements in such transplants survive or whether virus is liberated to produce a new tumour by infection of the host's own cells".

(2) *Tissue culture studies of tumour cells.*

The reaction of tumour cells to environmental changes is being studied by observing the effect of variation in the tension of carbon dioxide on cells of the mouse sarcoma 37.

"The activities of individual cells in culture of the various mouse tumours are being examined by time-lapse cinematography. *BP/8C* and *BAS/56* ascites tumour cells show 'tails' which may attach to the glass and which have great tensile strength and elasticity. The undulating surface membranes of these cells show very active pinocytosis and unusually large volumes of culture medium may be injected in this way."

(3) *Preservation of tumours in the frozen state.*

"The frozen tumour bank preserves tumours in an unaltered genetic state and these can therefore be used to check the respective inbred strains of mice for any genetic divergence which affects histocompatibility. In this way it has been shown, with a strain *A* specific tumour, not only that *A₂G* mice are genetically distinct from true *A* but that the genetic change occurred prior to 1952."

(4) *Heterotransplantation of human tumours.*

Human sarcoma tissue is being maintained by subcutaneous, intramuscular or intraperitoneal trans-

plantation in cortisone-treated hamsters, subcutaneously in cortisone-treated mice and in the anterior chamber of the eye in normal guinea pigs. The attempts to grow human lung cancer in guinea pig anterior chamber or in organ cultures were unsuccessful, but 25 per cent of human embryonic lung tissue grafts survived 22-49 days in mice treated with cortisone.

Other human embryonic tissues such as bone and bowel, some human adult tissue, for example, skin and transitional epithelium, and human prostatic carcinoma and adult rodent lung and prostate have all been maintained in fluid media. "Organ cultures of mouse prostate have been employed to study the direct action of oestrogens and androgens on glands from mice of different ages. The oestrogens produced epithelial atrophy and testosterone a stimulation."

(5) *Hormone-dependent breast cancer.*

About 50 per cent of human breast cancers cease to proliferate if they are totally deprived of the hormones which control cell multiplication in the normal breast. At present the operative technique of cutting off the supply of hormones is by the surgical removal of the ovaries, both adrenals and the pituitary. This somewhat drastic treatment may give spectacular growth regression and clinical improvement, but unfortunately these have proved to be temporary.

(6) *A pregnancy-dependent mouse tumour.*

The spontaneous mammary tumour BR6 has the peculiarity of always first appearing during pregnancy and mostly regressing after parturition. The tumour incidence is very high (in excess of 97 per cent in more than 400 mice that lived longer than six months, had more than two litters, and where the mothers had developed tumours). Under certain conditions some females not only remain tumour-free but give rise to tumour-free sub-lines which "... appear from transplantation experiments, to be genetically different from the tumour-prone line and one aspect of this genetic difference may be a greater androgen production by the males of the tumour-prone lines".

I. HIEGER

* Imperial Cancer Research Fund. Fifty-sixth Annual Report, 1957-1958. Pp. 39. (London: Imperial Cancer Research Fund, 1959.)

BEHAVIOUR OF SEA URCHINS

MANY of the habits of sea urchins were observed by A. N. Sinclair, during day and night diving in the waters around Sydney with members of the Underwater Research Group of New South Wales. An aqualung and a waterproof torch were used (*Austral. Mus. Mag.*, 13, No. 1; March 15, 1959).

When diving in daylight Sinclair was impressed by the numbers of the large, rough-spined sea urchin *Centrostephanus rodgersii*. Many of these were seen in hollows carved in the sandstone rocks, and often the hollows were deep enough to contain the whole urchin, but were never as deep, comparatively, as the sharply etched hollows carved by the smaller urchins, *Helicodaris erythrogramma*. Other urchins appeared to be motionless, with the spines sticking

out at right angles to the body surface in a typical 'hedgehog', or defence, position.

It was found that after darkness set in the urchins became active. Within an hour or two of sunset, numbers of *Centrostephanus* were seen 'out walking' on the rocks, but they did not seem to favour walking on the sand. The spines at such times were generally arranged in groups or cones. If a torch was shone on the urchin for a short time no reaction to the light could be observed, but if the urchin was touched it immediately assumed the 'hedgehog' position seen in daylight.

Results of marking specimens of *C. rodgersii* in Clovelly Bay, Sydney, had shown that the urchins moved up to 3 or 4 ft. from their rock holes within

two hours of sunset and returned to their own holes by the next morning, though often each was lying turned round from its original position.

During daylight it was common to see vacant rock holes, which, by the absence of weed growth, appeared to have been recently vacated. Usually, however, these holes were again occupied within a week, but tagging techniques had been inadequate to reveal whether the occupants were the original ones or newcomers.

Unlike most of the finer-spined urchins, the slate pencil urchin, *Phyllanthus parvispinus*, appeared not to live in holes, preferring crevices between rocks. In more than 200 sightings of these urchins, only one had been seen in a spherical rock hole. Most were in crevices, during daylight, but were so securely wedged in that they could only be moved by breaking spines. Other haunts of the slate pencil urchin were on the floor of forests of weed or kelp. Like *C. rodgersii* these urchins seemed to prefer deeper water and were more numerous in 20–30 ft. of water. Although each slate pencil urchin did not have its own particular rock hole, it returned to a particular locality.

The slate pencil urchins went out 'walking' at night, often covering 1 ft. in 20 min., and were seen attacking whelks bigger than themselves.

The commonest urchin at shallow levels within about 6 ft. of the surface was *Heliocidaris erythrogramma*. This was the dominant species, and practically the only urchin present in the intertidal zone. It lived in crevices and holes in the rock, which could be almost honeycombed. It appeared to dig

holes much deeper in relation to its size than any other species. This urchin appeared in many colours: greens, reds, browns and purples; a new one being revealed at almost every dive. The spines were smooth and relatively short. One of the most interesting combinations of spine shape and colour in this urchin was in the blue or mauve specimens.

Tripneustes gratilla, a wanderer from tropic seas, apparently had the distinctive habit of being unconcerned with the need for shelter. It was usually found on the walls of caves or in the open many yards from the nearest shelter. It was a large-bodied urchin with very short white spines tipped red or mauve. The rounded body had a plain darkish colour, or was white with five darker major bands and five secondary bands. Some of these urchins carried small pieces of shell or weed, presumably for sheltering from the light. *T. gratilla* was usually seen at depths of 10 ft. or more.

Most of the useful observations made by diving were of an ecological, rather than a systematic, nature, and an observation ledge had been carefully watched at frequent intervals during the past seven months; however, other observation points will be established after a twelve months period has been completed. A handicap to observation was that many local residents had developed a taste for eating sea urchins and the colony risked extinction.

In summer the colony comprised: twenty *C. rodgersii*; one *H. tuberculata*; and one *P. parvispinus*. By early July the numbers of *C. rodgersii* had fallen to fourteen, and later in the month had been reduced to ten.

JOURNAL OF APPLIED POLYMER SCIENCE

THE study of polymeric systems originated largely from technological considerations, but has now grown into a scientific subject in its own right, with its own techniques and outlook. This change has occurred in a very short time, and its rate of growth can be illustrated by the increasing size of the *Journal of Polymer Science*, which attracts contributions from both chemists and physicists interested in the preparation and properties of these interesting materials. From the original *Polymer Bulletin*, published in 1945 with 158 pages, it has progressed stepwise: 1946–50, 598 to 800 pages; 1951–54, 1460 to 1,864 pages; 1955–57, 2,432 to 2,420 pages; 1958, 4,256 pages. This seven-fold increase in thirteen years shows no sign of slowing down, and the publishers have therefore decided, as a transition measure, to split the journal, the original journal to continue, but in addition to publish the *Journal of Applied Polymer Science**. The latter is intended to deal with the properties of industrially significant materials, leaving articles of a definitely basic character to the original *Journal*.

It is difficult to see how this distinction can be maintained. The first number of the *Journal* includes papers on such basic matters as thermal expansion and transition temperatures, impact

strength and spherulite growth, and anisotropic properties of strained visco-elastic fluids. Perhaps a better grouping of subject-matter would be—preparative techniques; physical properties; characterization and constants, and applications.

The present tendency for publication of specialist journals, as distinct from the journals of learned societies of wider scope, must be taken as an inevitable consequence of increased specialization. Although it may facilitate the task of the scientist wishing to keep together papers on his own research subject, it has made it almost impossible for him to pay for the subscriptions. The stage has been reached where even the smaller scientific libraries cannot hope to purchase more than a small fraction of these specialist journals. This situation is likely to worsen, and the research man will have to visit large central libraries, or rely on abstracts to track down new papers of interest to him. Perhaps one solution is for the smaller libraries to pool some of their resources on a local basis, by arranging regular circulation through several laboratories. In any event one would like to see an extension of the system of reduced rates for personal copies. The increased cost cannot be blamed on the publisher; the cost per page has remained constant at 2.5 cents since 1952. The new *Journal* is somewhat larger in page size than the earlier publication, and this has improved the presentation and layout.

* *Journal of Applied Polymer Science*, Vol. 1, No. 1, January–February, 1959. Pp. 127. Published bi-monthly, covering two volumes annually. Subscription price, 17.50 dollars per volume. (New York and London: Interscience Publishers, Inc., 1959.)