

THE BEHAVIOUR OF BOWER-BIRDS

A COMMUNICATION by Prof. Evelyn Hutchinson, of Yale University, in a recent issue of the *American Scientist* (40, No. 1) throws considerable light upon the behaviour of bower-birds. The bower-birds are a group of Australian and New Guinea birds, generally classified along with the rifle-birds, Australian catbirds, and birds of paradise as the family Paradiseidae, or pair of families, the Paradiseidae and Ptilinorhynchidae, which most ornithologists have regarded as closely allied to the crows. Though they lack the resplendent plumes of their allies, the birds of paradise, some of the bower-birds exhibit behaviour of a kind which in its complexity and refinement is unique in the non-human part of the animal kingdom.

The unique feature of the majority of bower-birds is that, during the breeding season, the males build tiny ceremonial houses, set neatly in clearings and furnished with a variety of objects which are used in display and which, when not in use, are piled up carefully on the cleared area in front of the bower. These bowers have nothing whatever to do with the nests of the species, which are constructed by the female alone at some little distance from the male's display area.

Hitherto this extraordinary type of behaviour has been interpreted anthropomorphically; but some recent papers permit the behaviour to be interpreted primarily in avian terms. The studies related mainly to two species, the tooth-billed bower-bird, *Scenopoeetes dentirostris* and the satin bower-bird, *Ptilinorhynchus violaceus*. The former makes no true bower, though its behaviour is remarkable enough, while the latter not only builds a bower but also paints the inside of it, and so is perhaps one of the most advanced and complicated of all bower-birds in its habits.

Scenopoeetes is found only in a restricted area of north-eastern Queensland, living in tropical rain-forest. It is a dull-coloured bird about 27 cm. long and exhibits no external sexual dimorphism. The most remarkable morphological feature of *Scenopoeetes* is a triple saw-toothed apex to the maxilla, which fits into depressions at the apex of the mandible.

Like so many other male birds, the male *Scenopoeetes* occupies a definite territory during the breeding season, and from that territory he calls or sings. The central part of the territory, under the singing perch, is defined as a clearing, all the litter of the tropical forest floor being carefully taken away. On this clearing or stage, every morning the male *Scenopoeetes* arranges a number of leaves sawn off from neighbouring bushes and trees and placed with the pale conspicuous lower surfaces uppermost. Before this is done, the withered leaves of the previous day are carefully removed to a refuse pile outside the stage. The leaves are gathered by sawing through the petiole with the toothed tip of the beak. Not all species of bush or tree produce leaves which suit the tastes of *Scenopoeetes*, and individual males appear to have individual tastes in this matter. The leaves of *Alpinia* and *Darlingia*, which are often used, may be twice as long as the bird which collects and arranges them. The stage, which may be up to 2 m. × 3 m. in dimensions, can have more than forty leaves laid out on it. Although the toothed apex of

the bill is not known to have any function other than that of sawing through leaf petioles, many of the leaves used can be easily detached by a sharp pull that would seem to be well within the physical capabilities of the bird. If *Scenopoeetes* had discovered this, its whole life might have been easier, though its evolution would probably have run a different course.

In *Ptilinorhynchus violaceus* there is a more elaborate type of behaviour. The bird is about the same size as *Scenopoeetes* and of normal form, but is strongly sexually dimorphic; both sexes have intensely blue eyes. The males do not acquire their adult plumage until they are at least five years old. This is a remarkable age for maturity in a passerine bird, for most species have a mean expectation of life at fledging of a little over a year, and show little change in survivorship from year to year, even when the potential physiological longevity may be ten or a dozen years.

The bower of *Ptilinorhynchus* is described as made of two parallel rows of sticks, each row being about 30 cm. high and 35 cm. long. The two rows lean towards each other, so producing an incomplete roof space. The long axis of this structure is normally set north and south, and in front of the north end a display area is cleared.

On the display area, a number of coloured objects are systematically arranged. The objects collected by *Ptilinorhynchus* are usually blue, less often lemon-yellow or greyish-brown. Throughout the entire breeding season, the male is likely to pick up one of these objects, moving in and out of the bower and displaying in front of the object by erecting the feathers and making characteristic movements. A female may be lurking behind the bower while this is happening; but the male appears to pay more attention to the blue flowers, berries, pieces of broken glass, or in some cases even street-car tickets, than to the blue eyes of the female.

The bower, therefore, cannot be involved in sexual selection as such, though, since the building habits develop each year in association with increasing testicular activity, the bowers and adjacent display areas with the associated coloured objects presumably have a sexual significance. It is probable that the blue and to a less extent the other coloured objects provide a greatly enhanced visual stimulation of the kind otherwise received from the blue eyes and possible other epigamic colouring of the female.

After mating, the female leaves the area of the bower and builds a nest by herself. Throughout the period of nest building and incubation the male continues displaying at the bower. During this period spermatogenesis continues actively, though in most single-brooded monogamous birds sperm production stops after mating and nidification. When the young are fledged, they are brought by the female to the bower and for a week or two the family engage in communal display activities. Then the bower is abandoned and all birds join the autumnal feeding flocks.

Some males of *Ptilinorhynchus* have the extraordinary habit of making a paint out of charcoal, or fruit pulp, mixed with a secretion produced from the mouth, and of applying this paint to the inside of the bower by means of a wad of fibre from some soft kind of bark. The habit is exhibited only at the height of the breeding season, when spermatogenesis is most active and mating and ovulation are occurring. The significance of this behaviour is entirely unknown.

The available information suggests that the extraordinarily specialized behaviour of the bower-birds is an immensely complicated development of avian territorialism. The chronology of the events in relation to spermatogenesis, no less than the detailed sequence of the behaviour itself, is in accord with this idea. The need for such behaviour arises from the fact that it is advantageous for any male to secure his territory and mate as early as possible, for competition is often severe, while it may be highly disadvantageous for reproduction to begin until much later in the year when adequate food for the young is available.

In addition to an elaboration of this kind, there is the extraordinary substitution of inanimate objects for the primary sexual stimulus, a process which would be termed fetishism in human psychopathology. This curious development directs attention to the way in which individual culturally determined acts in man so frequently have parallels in the specifically characteristic behaviour of birds.

HEALTH OF THE SCHOOL CHILD

IN "The Health of the School Child", the report for 1948-49 of the Chief Medical Officer to the Ministry of Education (London: H.M.S.O., 1952. Pp. 92. 3s. net), it is stated that the children in Great Britain are healthier than ever before in our history.

The numbers of under-nourished school children are now so small that school medical officers do not consider that the subject calls for special mention. Some of them, however, give data on heights and weights. Between 1939 and 1949, London school children gained an average of $\frac{3}{8}$ in. in height and $1\frac{3}{8}$ lb. in weight. A striking feature was that the changes in height and weight were proportionate; while the greatest improvement had been in districts above average in 1938, there had also been a definite improvement in the worst areas. Children were not merely taller and heavier than their parents but were members of a generation altogether of greater physique. Figures relating to 5-year-old children in Wolverhampton showed that girls gained an average of over $6\frac{1}{2}$ in. in height and more than 8 lb. in weight between 1909 and 1949; boys gained an average of nearly $4\frac{1}{2}$ in. and $6\frac{1}{2}$ lb. during the same period. Weighing machines in senior schools in this area were no longer adequate for pupils in their last year.

During the period 1939-49, the school meals service multiplied roughly seventeen times and had changed out of all recognition. With restrictions on the building of new canteens, the report suggests concentration on stabilizing and improving the existing service. The development of training courses for staffs at all levels is proposed. The lack of courses for women who serve the meals is unfortunate, particularly since reports on food poisoning frequently attributed the trouble to lack of knowledge in the canteens.

Figures for October 1949 showed that 53.2 per cent of the children present (2,851,000) took school dinners, and there were 23,000 canteens serving 27,000 schools. 1,950 schools were then without school meals facilities. In addition, 86.9 per cent ($4\frac{3}{8}$ millions) of the children present took milk in school. More than 98 per cent of the milk was either tuberculin-tested or pasteurized.

During 1948, 96,262 school children had tonsil operations. The following year the figure fell to

69,449. The large number of operations in 1948—the figure was only exceeded in 1929-30-31—was mainly due to the widespread poliomyelitis epidemic in 1947. This caused the postponement of operations which would have been carried out in that year. The report stresses that tonsillectomy is scarcely ever an urgent operation and that only cases in need of urgent treatment should be referred to hospital for operative treatment. It is becoming increasingly realized that tonsillectomy is not a trivial operation and should not be treated lightly. Cases that are not urgent should be kept under observation for at least three months before being referred to a surgeon. All cases put on hospital lists should be examined periodically, since experience has shown that many who had been on a waiting list for a long time no longer required treatment. It is more important to deal safely and efficiently with a few children than to operate on large numbers, many of whom are in no need of urgent treatment.

The serious effect of the National Health Service on the school dental service is discussed. Because of the higher incomes obtainable under the new general dental service, many school dentists resigned to enter private practice. By the end of 1949, the number of school dental officers was 884 (equal to 732 full-time officers), compared with 1,063 (921 full-time) in 1947. In eighteen months, the service had lost one-fifth of its strength and was back to its war-time position.

There are signs in some areas that the improvement in the teeth of school children during and just after the War is on the wane. One report suggested that sticky buns given by mothers to restive young children was the possible cause of "the deplorable teeth so often seen in children between 5-7 years".

Nearly 450,000 school children (8 per cent of those on the registers) were found to be in a verminous condition in 1949. This was "profoundly disappointing" and showed no improvement on post-war years. In 1948, more than $4\frac{1}{2}$ million school children—probably more than half of those on the registers—were medically examined or re-examined, other than for dental disease or verminous condition. The incidence figures for the various defects showed no major changes from those of 1947, though increases in the number of cases of defects of vision and speech needing treatment were recorded.

The new outlook on physical education is commented upon, and the growth of interest and skill in athletics noted. In Wales, athletics had made considerable headway where hitherto progress had been slow. The Midland and South-Western Divisions also reported an increase in the popularity of athletics; in the North-Western Division it was "probably the one aspect of physical education in which improvement was most obvious".

The report contains a special chapter on the problems of diabetic children. England is believed to be the only country in the world providing hostels for these children; but the report stresses that while such accommodation is indispensable for a minority of diabetic children, the great majority should remain at home since there was no substitute for a good home. The report also contains chapters on the co-ordination of the school health service with the National Health Service, the treatment of defective vision, and the prevention of tuberculosis in school children.

The cost of the school health service and special schools, which was £10,194,000 in 1947-48, fell to £9,234,000 in 1948-49.