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Emergence of a Summer Species of Dragonfly

Two types of British dragonfly have been recognized, namely, spring and summer species. Spring species (for example, *Anax imperator* Leach, *Pyrhosoma nymphula* (Sulzer)) have been defined as those having a diapause in the final larval instar and, in consequence, a closely synchronized emergence. In summer species (for example, *Aeshna cyanea* (Müller), *Lestes sponsa* (Hansemann)) diapause is by definition absent from the final instar, although sometimes developed in another stage in the life-history¹. The lack of a final instar diapause in summer species made it seem likely that emergence in this ecological group would be less closely synchronized than in spring species, and that in some cases it might inherit from the larval population a time-frequency distribution approaching normality². Although emergence of *L. sponsa* has been found to be temporally dispersed³, when compared with that of *P. nymphula*³, its exact temporal distribution and duration have hitherto remained unknown. Recently, however, the emergence pattern of another summer species, *A. cyanea*, has been determined directly by means of exuvia counts made in Nature, and the results provide a striking confirmation of expectation.

In Fig. 1 the emergence curve of *A. cyanea* is compared with that of *A. imperator*, a spring species in the same family and of similar size. The two curves differ significantly in the degree of their synchronization, a point well demonstrated by comparing the times during which 50 per cent of the annual population emerged: this stage was reached by the third day of emergence in *A. imperator*, but not until the twenty-fifth day in *A. cyanea*. Total duration of emergence in the two species was, however, approximately the same, being 44 days and 49–55 days, respectively.

Fig. 1. Time-frequency distributions of adult emergences in (A) a spring species and (B) a summer species. A: *Anax imperator* in Berkshire during 1953; emergence began on May 25 and finished on July 7. B: *Aeshna cyanea* in Hampshire during 1957; emergence began on June 29 and finished between August 16 and 22.

Such large differences in the temporal distribution of emergence will have important effects on other stages in the life-history. For example, early population pressure at the breeding site, and the resulting dispersal during the first few days of maturity, will probably be far more pronounced in spring species than in summer species. Also, the ecological demand for reproductive longevity will supposedly be greater in summer species, in which adult populations are heterogeneous with respect to the age of their members. In this connexion it is interesting to note that, in a Dorsetshire pond, Moore⁴ found the flying season of *A. cyanea* to be very much longer than that of *A. imperator*.

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Feeding Habits of Emperor Penguins

THE feeding habits of emperor penguins (*Aptenodytes forsteri* Gray) have been described by previous authors¹⁻³. Most agree that the birds have access to the sea through tide cracks. During the winter of 1957 in Antarctica, I was able to observe this phase of the birds' activities and can now amplify previous comments.

The breeding cycle of the emperor penguin is peculiar in that it occurs in the depth of the antarctic winter. After the laying of the single egg (in May in most rookeries) the female bird leaves the rookery for approximately nine weeks while the male bird incubates it. No trace of the females is seen until hatching commences, when they return in large numbers to the rookery to commence feeding the chicks while the males go to sea to end their long fast. The chicks grow rapidly, and the constantly increasing demand for food means that both parent birds travel to and fro from the feeding places, gorging themselves with fish and krill, then regurgitating food for the chicks.

Taylor rookery (67° 28' S., 60° 53' E.), fifty miles west of the Australian National Antarctic Research Expedition's base Mawson, is unique in that it is situated in an old glacial valley adjacent to the sea.

All other known rookeries, with the exception of the one at Dion Islets, are located on sea ice. It is flanked by a glacier on its western side and is surrounded by a ring of high hills which afford much protection from wind. During the chick-feeding period here, the majority of birds do not travel more than two or three miles to feeding holes. Between the glacier and some nearby islands are a number of tide cracks, parts of which are kept open by glacier movement, Weddell seals, and feeding emperor penguins which congregate in large numbers near these holes. An interesting fact is that the birds do not feed for very long at these holes. Presumably