

Council on Wage and Price Stability (CWPS) intervened when OSHA was considering exposure limits for cotton dust. Bowing to pressure from CWPS, the dust limit was eased by OSHA thus saving industry an estimated \$600 million annually; the price for this, the agency admitted, was about 5,260 cases of byssinosis.

By 1981 OSHA had issued only 21 complete health standards, covering some 16 carcinogenic chemicals as well as arsenic, lead, asbestos, cotton dust and coke oven emissions; its general carcinogens policy was — and still is — under discussion. Compulsory exposure limits had also been issued for some 400 substances but these were simply taken from earlier recommendations by the American Conference of Government Industrial Hygienists. Nonetheless opposition from industry to the vinyl chloride, coke oven, arsenic, cotton dust and lead standards was intense. The imposition was, says McCaffrey, "a significant accomplishment by OSHA".

However, the battles in court over these standards have had their effect. According to McCaffrey, the agency now spends far more time in the preparation of regulations than it did in its formative years. Early court decisions, pointing out that there were so many uncertainties in the control of chemicals that decisions had to reflect policy judgements rather than a mere analysis of facts, have encouraged introspection to the point of timidity. Even the General Accounting Office — the investigatory arm of Congress — was moved to remark that decision-making in the agency was now taking far longer than it ought.

Standard-setting is also greatly influenced by the court which rules on the matter, the Fifth Circuit Court in New Orleans having the reputation of ruling in favour of industry and for less stringent controls; the US District Court for Columbia for supporting labour. Such differences result in some unseemly races to place the issue before a particular court. And a court ruling rarely settles the matter — often it is a stratagem adopted by industry to delay the imposition of controls.

McCaffrey is right to suggest that in the short term OSHA will not have many successes. But while he makes few predictions for the long term, the outlook may not be too bleak. Sooner or later the pendulum will swing back, giving OSHA some of the encouragement it so clearly needs to carry out the work Congress asked it to do. □

Alastair Hay is a Lecturer in the Department of Chemical Pathology, University of Leeds. He is author of The Chemical Scythe: Lessons of 2,4,5-T and Dioxin, published late last year.

• *Splendid Isolation: The Curious History of South American Mammals* by G.G. Simpson (Yale University Press), reviewed in *Nature* (286, 543), is now available in paperback; price £7.95, \$8.95.

Colour of success

Linda Partridge

The Arctic Skua: An Account of the Ecology, Genetics and Sociobiology of a Polymorphic Seabird.

By Peter O'Donald.

Cambridge University Press: 1983.
Pp. 324. £25, \$49.50.

MANY important evolutionary questions can be answered only by demographic studies of populations of marked individuals. But partly for reasons of funding, studies of natural selection in long-lived species are very unusual. Peter O'Donald's book is a welcome addition to this area, the Arctic Skua (Parasitic Jaeger for North American readers) being fairly long-lived with an annual adult mortality of about 11%. The book is mainly an account of an eleven-year study of the bird on Fair Isle, with additional material on its general ecology and status.

The Arctic Skua's feature of particular interest is the presence of conspicuous discontinuous variation in plumage colour.

IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

Arctic Skua — pale morph.

There are three morphs (pale, intermediate and dark). While there is lingering uncertainty about the precise pattern of inheritance, it is clear that the different plumages are the result of a genetic polymorphism.

O'Donald's main interest is the process of sexual selection, and it is the role of this in maintaining the plumage polymorphism that he considers in detail. Sexual selection occurs because of variation in the quantity or quality of mates obtained by different individuals. Arctic skuas are monogamous, so mate quality is the variable of interest. Among pairs breeding together for the first time (about 40% of breeders), those containing dark males breed earlier in the season and this early breeding is associated with high breeding success. O'Donald assumes that breeding date is determined by the female and that dark males are preferred as mates; when new pairs form the dark males acquire those females that are in breeding condition earliest and are thus able to breed at the most advantageous time. Sexual selection therefore favours dark males.

Sexual selection can occur in two ways. Intrasexual selection is a result of rivalry between members of one sex (usually the

male) for access to the other. Intersexual selection occurs where one sex chooses between potential mates. O'Donald attempts to show that dark male Arctic skuas are preferred by females, and that this is why they obtain mates early in the breeding season.

However, the main evidence cited for female choice of male plumage is indirect only, relying on goodness of fit to models of the process, and it is a pity that the alternative mechanism of male competition was not more fully explored. Pairing takes place on territories defended by males and subsequently used for nesting and sometimes feeding. Dark males may acquire territories of better quality and females may choose territories rather than male phenotypes. Simple observations of territory establishment would help to clear up this question; one could also alter plumage or territory quality experimentally.

Sexual selection alone could not maintain the plumage polymorphism, although it might be expected to have led to the evolution of sex-limited plumage colour with all the males dark. Be that as it may, a further factor to be considered is that dark birds are at a disadvantage in that they first start breeding at four years or older, while pales may breed in their third year and hence are more likely to survive to breed at all.

At least on Fair Isle, the various selective forces are not in balance. Combining all the breeding data for males and females, and extrapolating to lifetime breeding success, pales have a net advantage. O'Donald concludes that the polymorphism is the result of geographically varying selective forces with migration between breeding colonies. There is a marked geographic cline in morph frequencies, with pales at highest frequency in the north of the distribution. Some as yet unidentified selective force must therefore give pale an advantage in the north and dark in the south of the species range.

It is a pity that O'Donald does not widen his discussion to other aspects of the bird's biology. It is difficult to collect data on skuas outside the breeding season, but there may well be differences in, for example, feeding ecology between the morphs.

Perhaps the greatest strength of the book is the rigour and clarity of the data analysis. Its main weakness is one often found in genetic studies, namely a disregard for the importance of direct observations of behaviour. The main conclusions do occasionally become buried in a mass of parameters and confidence limits, but the occasional withering attacks on earlier work add some spice. O'Donald's personal affection for the birds and their habitat comes through very clearly and, with the lovely Gillmor illustrations, compels the reader to share in his enthusiasm. □

Linda Partridge is a Lecturer in the Zoology Department at the University of Edinburgh.