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COLOR-DYEING ALBATROSSES

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During recent expeditions to Bird Island, South Georgia (54₀ 00'S. 38⁰⁰5'W.) where albatrosses have been studied since 1958 (Tickell and Cordall 1960; Tickell 1962; Tickell, Pinder and Clagg 1965), Wandering Albatrosses *Diomedea exulans* have been colored with plumage dye to obtain data upon their distribution at sea. This technique was originally developed for white geese in the United States, but its application to sea-birds has presented different problems.

Many of the questions that are asked about the pelagic distribution of sea birds are clearly unanswerable by the traditional

methods of observation from coasts and ships on passage. Ringing also is of little help as the opportunities for recovery at sea are negligible. The ability to make a sample of a particular breeding population conspicuous even at a distance could be a most valuable addition to the techniques available to marine ornithologists.

White birds are best for coloring; darker plumage is impossible to color with any effect. The more conspicuous the birds are at sea in their normal plumage the better the chance is of unusual colors being noticed. For example, the huge wingspan of the two great albatrosses *D. epomophora* and *D. exulans* probably accounts for their being noticed at sea more than any other birds in the southern hemisphere. Of the several species available at South Georgia only the Wandering Albatross was colored, in order to avoid confused instructions to unknown observers. Adults of this species are sufficiently white to be ideal subjects. The dye used was Rhodamine 'B' in an alcohol/water mixture; ten grams of powdered dye were dissolved in five gallons of isopropyl alcohol and the mixture diluted with an equal volume of water (Kozlik 1956).

For the first trials in 1961 we used a galvanized bath measuring 3' x 2' which was half filled with dye mixture. Captured albatrosses were held in this while the dye was liberally applied to back and wings with large brushes. By this method the first five gallons of the dye were sufficient to color only 15 Wanderers, so afterwards only wings and back were dyed. Altogether 75 birds were colored that year with about 18 gallons of dye. Sea-birds have ample opportunity for washing out dye if they get into the water before their plumage has dried, and it was not practicable at Bird Island to hold large numbers of birds until they dried. Most dyed birds did in fact stay ashore until dry, probably because they were too waterlogged to fly, but occasionally a newly dyed bird walked to the top of a nearby cliff and took off in a long glide to the sea.

One bird which was recovered off New South Wales, Australia, several months after leaving South Georgia was still brightly colored under the wings, and the following summer, 12 months afterwards, there were many Wanderers on the nesting grounds at Bird Island which still had conspicuous pink patches. Elsewhere beneath the white contour feathers of these birds the protected feathers had retained the color.

From this experience it was obvious that there was no value in dyeing more than the outer surface feathers. It was also necessary to do away with the cumbersome bath and reduce the heavy loads of alcohol that had to be carried about the mountainous island. During the next two seasons (1962-63 and 1963-64) we therefore employed a portable agricultural sprayer (3 gallon capacity) mounted on a pack frame, and with the help of this equipment the whole operation could be carried out by one person. Wanderers at Bird Island are comparatively docile and their incubation urge sufficiently great that they will return to the nest after being disturbed. This allows dyed plumage to dry without need to confine the bird. Subsequent dyeing was therefore confined to Wanderers which were incubating eggs or brooding chicks; the procedure

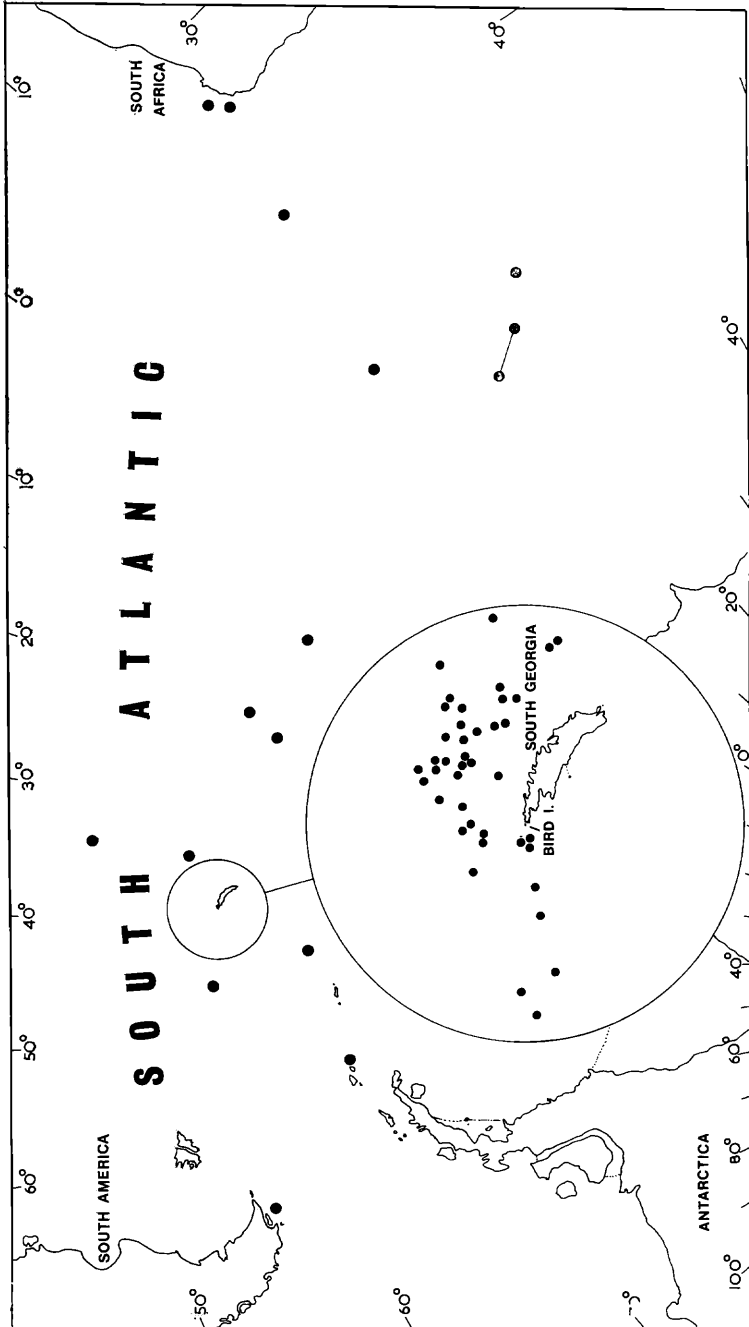


Fig. 1. Distribution of sightings of pink Wandering Albatrosses *Diomedea exulans* dyed at Bird Island, South Georgia, 1960-61, 1962-63 and 1963-64.
●—● = two reports probably of the same bird.

adopted was as follows. The nest and brooding bird were approached with as little disturbance as possible. A quick grasp with one hand secured the large bill by which the bird could be lifted from the nest, while the other hand operated the spray nozzle. Placed on its back resting against the operator's boots the albatross's wings fall open and the whole of the underside can easily be sprayed. Afterwards it was placed on its breast and the back sprayed before release. Although they would generally gobble aggressively at the operator after release the colored birds always climbed quickly back on to the nest and resumed brooding, at the same time spreading the dye by preening. If the bird was incubating, then the egg was removed first of all to prevent trampling, and returned afterwards.

During two seasons 305 birds were fully colored and another 580 partially dyed on head or neck. Most of the 57 sightings (Fig. 1) reported were obtained from whale catchers within 150 miles of Bird Island, and it is noticeable that more of them occur to the north than to the south of South Georgia. However it is probable that these reports reflect the distribution of whales as the catchers were never evenly distributed over the whole area. It has long been known that a rich plankton belt occurs to the north of South Georgia (Hardy and Gunther 1935), and it is probable that this is an important source of food for both whales and albatrosses. It is clear from this that no matter what method of marking is used the real pattern of pelagic distribution will only become apparent when there are facilities for randomizing observations over the area within flight range of the breeding station. It may in some instances be possible to do this by observations from ships in the normal course of their commercial, scientific or naval business, but satisfactory results are more likely when a vessel is available to sail specifically-designed ocean transects for the purposes of the research.

Of the more distant sightings it can be said that incubating Wanderers may move as far as 970 nautical miles from the breeding ground, and later in the winter when the chick is alone in the nest parents may travel as far as 2,640 miles from Bird Island. Although parents are known to be away from the nest long enough to cover such distances (Tickell 1968), these interpretations are subject to uncertainty on two counts. Firstly we cannot be sure that they are not reports of birds that have lost their eggs or young and have departed for the breeding season. Secondly, although we had been particularly careful to color only breeding birds, the same color was used in two consecutive seasons. During the 1963-64 summer there was therefore a small proportion of birds at sea moving away from South Georgia which had been dyed the previous summer and had not finished feeding their chicks until November-December 1964. This is probably a difficulty peculiar to the great albatrosses as most species will not retain dye for as long as a year, and the use

of different colors each year would have been an easy solution. It is also important in any such studies to be able to measure the proportion of birds being lost from the sample dyed. For instance, if breeding birds are being dyed then it is necessary to know the number of those colored birds that are losing eggs or chicks and are therefore likely to behave differently at sea than if they were off duty from incubation or foraging for a chick.

I have tried to show in this paper some of the difficulties and drawbacks attending a new technique. Like other methods of marking it is no more than a tool and the quality of results depends upon the way it is used. Nevertheless I believe that on suitable species it has far-reaching potential in linking studies by ornithologists and marine biologists of what is after all a common ecosystem.

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