or five yards from the ground; while most of the insectivorous birds, especially the drongos, bee-eaters, rollers and swifts, feed twenty feet up at the least. There may be no hard and fast line here, but there is a clear and general tendency.

It was in these same hills that Mr. Salim Ali recorded[1] a huge hatch of "thousands upon thousands" of the large butterfly *Danais melissa dravidarum*, which were being taken on the wing by the ashy swallow shrike (*Artamus fuscus*). This bird I did not see. But Mr. Salim Ali notes that "*they were the only bird-species interested in these butterflies*", and concludes, from his observations elsewhere, that their food "seems to consist of butterflies to a very large extent".

Attacks by birds on butterflies not flying but at rest is the second part of my subject; and I found a good many more birds taking their insect-prey from trees and undergrowth than hawking it on the wing. Swifts, rollers and bee-eaters took no insects at rest, only those on the wing; all the others mentioned above took them at rest, and so did the other insect-eating birds, such as the babblers, warblers, white-eyes (Zosterops) and orange minivets; while bulbuls, mynahs and tree magpies were all partially insectivorous. It is not so easy to watch the feeding-habits of these birds as of those which take their prey upon the wing; but once again, my results were all completely negative—these birds ate no butterflies at all.

As to the ecological side of the question, most of the butterflies go to rest within small clumps of bamboo and other undergrowth, or occasionally in the inner foliage of evergreen trees. But only a few birds made these their usual feeding-places, such as the warblers and the white-eyes, both small birds with weak bills, and the babblers which are strong active birds; these latter roam the forest in bands or companies, and habitually search the dense thick undergrowth, the resting habitat of many butterflies. Thus the babblers would seem to be by far the most likely predators on butterflies (in addition to Artamus) in this region. But though I caught a number of butterflies, and paid particular attention to those with tattered wings, in no single case could I detect a trace of beak-marks on their wings.

C. R. STONOR.

South India.

[1] *J. Bombay N.H.Soc.*, **38**, 315 (1935).

Production of Mutations by Allyl *Iso*thiocyanate

IN the course of the past few years, we have examined a number of chemical substances for their ability to produce gene mutations. The experiments were carried out on *Drosophila melanogaster*. Some of the substances were found to be highly effective, producing mutation-rates of the same order as those obtained with X-rays, 6–24 per cent sex-linked lethals developing in treated *X*-chromosomes. These data will be published later.

Although the production of mutations by these potent synthetic substances is of great interest for the light it may throw on the nature of the gene and the process of mutation, the search for naturally occurring substances with the capacity to produce the same effect appears, from the point of view of evolutionary theory, even more important. It is therefore of special interest that among the substances tested we have found one, namely, allyl *iso*thiocyanate (mustard oil), which has a definite though slight effect on the mutation-rate, and which occurs naturally in a variety of plants, for example, *Brassica nigra* and other Cruciferæ (Klein[1]). A summary of the data on which this conclusion is based is given below. A full report will appear later.

The technique used was the *ClB* test for sex-linked lethals, which is the standard test used for detecting lethal mutations which develop in the *X*-chromosomes of the spermatozoa in treated (and control) males. Two experiments were carried out. With the second a control was done simultaneously on flies collected from the same culture bottles as the flies for treatment. The results are shown in the accompanying table.

Expt.	No. of *X*-chromosomes tested	No. of lethals detected in the chromosomes	Lethals (per cent)
1	756	17 (+1 doubtful)	2·2
2	878	19	2·2 } Diff. = 15±4·8
Control	963	4	0·4 }

The difference between the treated and control series in the second experiment is clearly significant. Moreover, in both experiments the mutation-rate markedly exceeds the range of the spontaneous occurrence of sex-linked lethals in normal stocks, which scarcely ever reaches even 1 per cent.

In addition, three sex-linked visible mutations were obtained in the two treated series, none in the controls.

Experiments are under way to determine whether allyl *iso*thiocyanate can also produce chromosome breaks.

C. AUERBACH.
J. M. ROBSON.

Institute of Animal Genetics
and Department of Pharmacology,
University of Edinburgh.
June 5.

[1] Klein, G., "Handbuch der Pflanzenanalyse", Part 2, Chapter 26 (Springer, Vienna, 1932).

Increased Alkaloidal Contents of Induced Polyploids of Datura

TETRAPLOID plants of various species of Atropa, Datura and Hyoscyamus have been produced by the treatment of their seeds with colchicine solution; polyploidy being judged by the sizes of stomata or of pollen grains and by chromosome counts in root-tip preparations. Tetraploid plants of *Datura Stramonium* Linn. and *D. tatula* Linn. were healthy in appearance and produced as great a weight of dry leaf per plant as the diploid controls. Abundant viable seed was collected from them and produced F_1 and F_2 generations of tetraploids in the two following years.

Chemical determinations of the individual alkaloids *l*-hyoscyamine, atropine and hyoscine have been carried out on the dried leaves from diploid and tetraploid plants grown from seed of different origins. Results of assays, calculated with reference to the leaves dried at 100° C. for six hours, are shown in the accompanying table.

Analyses of F_1 and F_2 generations showed similar