EAST AFRICAN RECORD

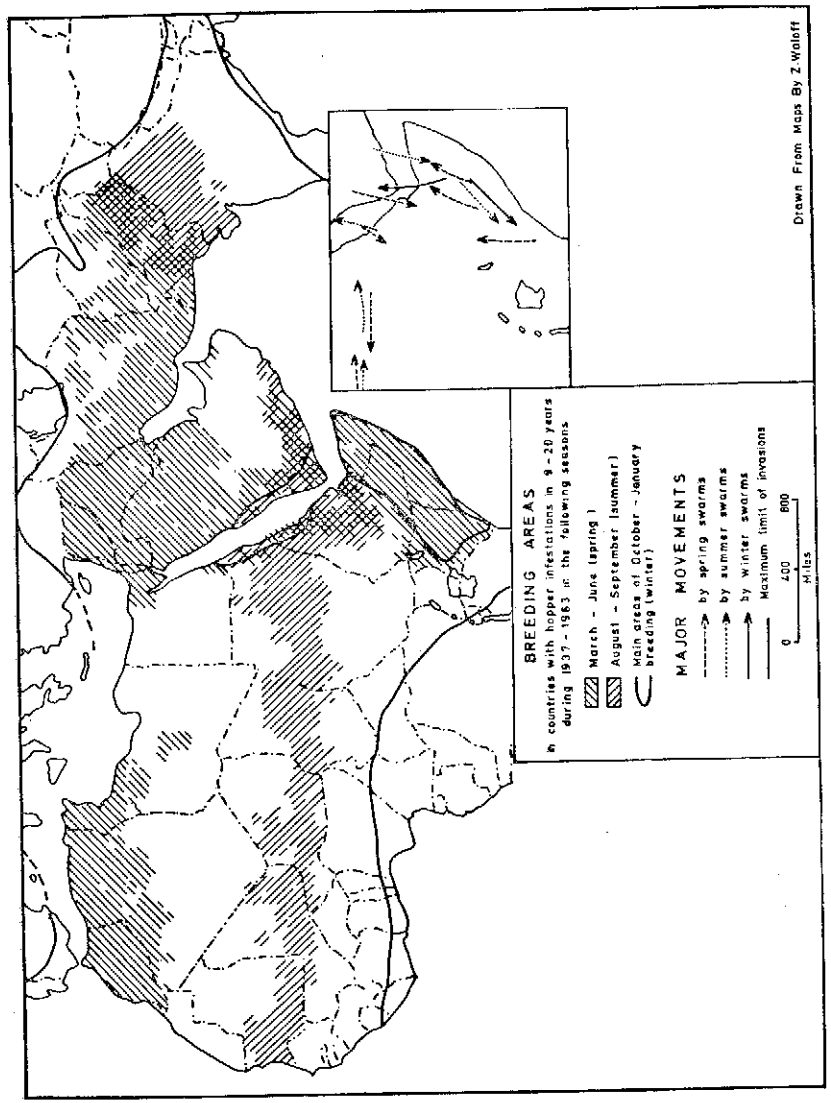
LOCUSTS IN EAST AFRICA AND THE NATURE OF THE CURRENT THREAT

D. J. GREATHEAD

Locusts have figured in records from the earliest times as one of the most dramatic of insect pests. Not until Uvarov propounded his phase theory in 1921 was progress made in understanding what locusts are and how they appear so suddenly and with devastating effect. Uvarov showed that locusts were simply grasshoppers (Acrididae : Orthoptera) with the special facility of changing phase from the normal solitary form to an active gregarious form. This led to extensive field exploration in the 1930's and 1940's which gave an understanding of the outlines of the process in Africa and to the setting up of control and research organisations.

One of the results of this activity was the discovery that some of the locusts seem only able to develop plagues in strictly limited areas called outbreak areas. This applies to two of the four important African locusts, the Red locust (*Nomadacris septemfasciata* Serville) which has its outbreaks in a number of central African swampy areas (Gunn 1960), and the African Migratory Locust (*Locusta migratoria migratorioides* R. & F.) which develops outbreaks on the floodplains of the middle Niger (Batten 1967). The third species the Brown Locust (*Locustana pardalina* Walker) has no such precise geographical outbreak area but a climatic zone defined in terms of rainfall on the South African Karoo (Lea 1958). Unlike the plagues of the first two which affect most of tropical Africa its plagues affect only Africa south of the Zambesi. The fourth species the Desert Locust (*Schistocerca gregaria* Forskal) is even less tied and can develop outbreaks in a belt across the middle of its invasion area which extends from the Atlantic to Burma and from the Caucasus to Tanzania (Waloff 1966). As this species is the subject of the present threat the rest of this account will be confined to it though much applies to the others as well.

The life cycle is simple. After pairing, 50-150 eggs are laid as a "pod" in a hole dug in the ground and filled with a frothy plug. After about two weeks (in the tropics) the "hoppers" hatch and pass through 5-6 instars before becoming winged adults. Each hopper stage lasts about one week and the immature adult lives from two weeks to six months before maturation. Several pods are laid by each female. Solitaries are green or brown, lighter at birth, often have six hopper stages, lay more eggs on each occasion, migrate at night and show no attraction to others of their own kind. When convergent weather prolongs breeding or some other factor causes concentration a change takes place, the hoppers develop a striking yellow and black pattern and always have five stages, the adults are pink turning yellow on maturation, lay fewer heavier eggs, move in aggregations and fly by day. This change is accompanied by increased activity, the hoppers marching in "bands" and the adults flying in "swarms".



The whole process is dynamic and reversible and is governed by climate. An important factor is wind which guides flight into zones where rain is likely. This happens because locusts are unable to fly up wind unless it is below about 9 m.p.h. Rainey (1961) first showed that in the tropics the effect is to concentrate locusts in the region of the Intertropical Convergence Zone. This opened the way to the understanding of swarm movements and the development of a forecasting system—the Desert Locust Information Service sponsored by F.A.O. and housed at the Anti-Locust Research Centre, London.

The consequences of the dependence on climate are exploited in control but are also the chief factors in initiating and ending plagues. Failure of rains or unusual wind patterns are major destructive forces. Natural enemies including birds, terrestrial vertebrates, insects, Arachnids and diseases also play a part but their effect is rather to hasten collapse or delay build up (Greathead 1967).

Natural enemies are certainly not sufficient to prevent crop damage which can be severe (Bullen 1966) so that control measures must be mounted. Early methods such as scaring and beating gave way to baiting and spraying, and these in turn to new sophisticated methods of ultra low volume sprays from aircraft and vehicles using Dieldrin. These techniques form the basis for the strategy of the Desert Locust Control Organisation for East Africa.

The last Desert Locust plague petered out in the early 1960's when a relatively long quiet period lasting until March-April 1967 ensued. Then heavy rain fell in many areas in the Sahara, Arabia and further east. This led to the build up of populations and control measures in the western Sahara at the end of the year. Heavy rain again in March-April 1968 saw gregarious breeding in Arabia and the Red Sea area. The resulting swarms entered other areas including Ethiopia and former French Somaliland where heavy breeding occurred in June-August. Escapes from control moved south breeding in Somalia and the Ogaden of Ethiopia but did not, as expected, reach northern Kenya. The threat is now over until the end of 1969 when swarms can again be expected to enter East Africa unless the control organisation is able to suppress them completely.

This paper is based on a lecture delivered to the Uganda Society in May 1968 and brought up to date in February 1969.

Selected References

Batten, A., 1967. Seasonal movements of swarms of *Locusta migratoria migratorioides* (R. & F.) in western Africa in 1928-1931. Bull. ent. Res. *57* : 357-80.

Bullen, F. T., 1966. Locusts and grasshoppers as pests of crops and pasture—a preliminary economic approach. J. appl. Ecol. *3* : 147-68.

Greathead, D. J., 1966. A brief survey of the effects of biotic factors on populations of the Desert Locust. J. appl. Ecol. *3* : 239-50.

Gunn, D. L., 1960. Nomad encompassed. J. ent. Soc. sth Afr. *23* : 65-125.

Lea, A., 1958. Recent outbreaks of the Brown Locust, *Locustana pardalina* (Walk.), with special reference to the influence of rainfall. J. ent. Soc. sth Afr. *21* : 162-213.

Rainey, R. C., 1951. Weather and the movement of locust swarms: a new hypothesis. Nature, Lond. *168* : 1057.

Uvarov, B. P., 1921. A revision of the genus *Locusta* L. (=*Pachytylus* Fieb.), with a new theory as to the periodicity and migrations of locusts. Bull. ent. Res. *12* : 135-63.

Waloff, Z., 1966. The upsurges and recessions of the Desert Locust plague: an historical survey. Anti-Locust Mem. *8* : 111 pp.