Above: *A Piper Cub skims the grass, spraying insecticide on the locusts which breed on these Rukwa Valley flood plains.* **Left opposite:** *A swarm of red locusts, once common in Central and Southern Africa, now seen only in the permanent breeding grounds of Southern Tanganyika and the Mweru swamps of Northern Rhodesia.* **Right:** *An adult red locust.*

FROM ABERCORN, MOST NORTHERLY TOWN in the Federation, close to the toe of Lake Tanganyika, an international war is being waged, and has been for the last 20 years. There is still no let up and no prospect of the war ending. The enemy are the locusts that breed in their millions in the swamps and plains of Southern Tanganyika and the marshlands of the Mweru swamp in Northern Rhodesia. Against them the International Red Locust Control Service has evolved a strategy that today employs aircraft and the most modern insecticides available to kill millions of the locusts and contain the rest in what are known as the "outbreak" areas.

So successful have the operations of the service been that many people in the Federation have never seen the vast locust swarms that once ravaged Africa from the Sahara to the Cape. But some of the older Rhodesian residents still have vivid — and sometimes painful — memories of the plague that lasted from about 1930 to 1944.

Dark clouds of locusts then spread out in all directions from their permanent breeding grounds in the region of Lake Tanganyika, leaving great swathes across Africa of leafless trees, grassless tracts, and empty crop lands. Swarms varying in size from two square miles to more than 100 and weighing from 1,000 to more than 50,000 tons ate their own weight in vegetation every day — and grain crops were their preferred diet.

The calories of energy required daily by only a small migrating swarm of 1,000 tons would be adequate for 100,000 men. The value of food eaten by locusts every year amounted to millions of pounds. As in the Biblical eighth plague of Egypt, "there remained not any green thing in the trees, or in the herbs of the field, through all the land . . ."

Mr. Geoff Beckett, former Member for Agriculture and Natural Resources in the Northern Rhodesia Government, remembers the 1930-44 plague well. "I was farming at Choma in 1932," he recalls, "when the red locusts swarmed over Northern Rhodesia, and in spite of everything I could do, the locusts cleaned me out. As if that was not enough they did it again in 1933. And it nearly finished me when they did it again in 1934. The locusts ate the crops and veld vegetation and even swarmed into the homesteads.

"In the 1930s the Northern Rhodesia Government employed 20,000 men on killing the young hoppers and made so little impression they gave it up. In 1935 and 1936, South Africa spent £1,000,000 on fighting the same plague."

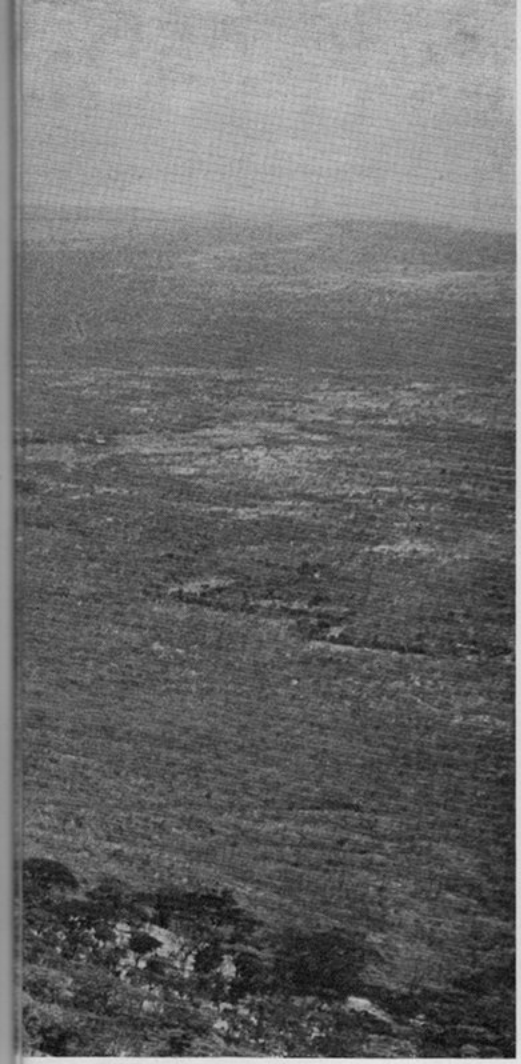
But it was to no avail. Man could not stem the tide of locusts

An aerial view of Mbizi escarpment, looking across the locust breeding grounds of the North Rukwa Lake flood plains.

that now covered 3,000,000 square miles — an area the size of the United States. Eventually, in 1944, it was only a combination of wet weather, other natural causes, and chemical control that cut the locusts back to the proportions of before 1930.

There are four types of locust in Africa. The red locust is responsible for most of the plagues south of Central Tanganyika, but also spreads far north of this; it is the biggest locust of all. Then there is the desert locust of the Bible, whose ravages range from Northern Tanganyika, through Kenya, up Africa and across the Red Sea and as far east as India and Pakistan. The brown locust harasses farmers in South Africa and, to a certain extent, Southern Rhodesia, but causes far less trouble than the red locust. And finally there is the migratory locust, which breeds in the flood plains of Central Niger, in the region of Timbuctoo.

Other species of migratory locusts breed in the Central African flood plains, the



permanent home of the red locust, but do not swarm there; and the red locust breeds in the West African flood plains, the outbreak area of the migratory locust but, for some unknown reason, does not appear to be able to form migratory swarms there.

The adult red locust measures about three inches from the front of its head to the tip of its folded wings. When they are numerous and overcrowded in their permanent home, they form huge swarms and migrate in all directions, travelling hundreds of miles for about eight months.

Egg-laying starts in November or December, after the first rains. The female pushes the tip of her horny abdomen into the soil and deposits a pod of about 60 or 70 eggs before moving on, and each female can do this three or four times during her life. In about a month the eggs hatch as greenish-grey hoppers, which wriggle out of the ground looking very much like little worms.

Within a few minutes they cast their skin and look like small grasshoppers — brown with black and yellow markings. Hoppers gather together in bands and move off across the plain in search of food. For three months they are wingless, but grow quickly, casting their skin six times. During this stage the control measure is to spray their habitat with dieldrin, which acts as a stomach poison.

After their sixth moult, they are adults with four strong wings which can carry them far during the eight or nine months left of their lives.

The adult locusts, strangely, go through two phases — the solitary and the swarm phase. While in its solitary phase in the natural breeding grounds, the locust is not dangerous, but as numbers increase, changes occur in colouring, markings and behaviour. The locusts enter the swarm phase — and then the trouble begins.

The manner in which this phase change takes place is little understood, and is the subject of constant research. If the numbers of locusts are kept down, for instance, the change does not occur and the insects continue to live in their solitary phase until they die.

Entomologists define locusts as being swarming grasshoppers, since structurally there is no difference between the two. While in their solitary phase the locusts are, in fact, often called grasshoppers — though to a layman they are indistinguishable from the swarm phase locusts.

In control work the adult locusts are now sprayed with a 20 per cent D.N.C. (dinitro-ortho-cresol) solution in oil. This contact poison has been found more effective than the low concentration of B.H.C. (benzene hexachloride) formerly used.

During the plague that lasted from 1930 to 1944, preparations were begun to prevent another such plague from ever occurring again; the search for the breeding grounds in which to control the swarms had already started in 1929. An English entomologist, A. P. G. Michelmore, began journeys over a wide area of Central Africa in an attempt to prove a theory that the locusts originated in a comparatively small area, and spread out from there.

He met an intelligent chieftainess, Mwene Maria, who told him that her tribe could always find locusts to eat in the Rukwa Valley, nearby. On investigation he found this, the most important home of the red locust — a sea of grass, interlaced with streams in the dry season and flooded in the wet.

In 1930, Billy Allan, of the Northern Rhodesia Agriculture Department, discovered another important breeding ground, the Mweru wa Ntipa marsh, close to the Congo border. Later, another swamp area, Malagarasi, east of Kigoma on Lake Tanganyika, was found to be an outbreak area. Finally, in 1959, a fourth outbreak area was recognized — that of the Wembere Steppe in Central Tanganyika, east of Tabora.

Before the war started an international red locust conference was held to plan the control of the outbreak areas — to destroy the swarms before they could leave their swampy homes and ravage the farmlands of Africa. The International Red Locust Control Service was accordingly established and, although it was not formally inaugurated until 1949, the erection of buildings had started in Abercorn in 1941.

As a war measure, to conserve food, the British and Belgian Governments had decided to go ahead. The British colonies in East and Central Africa, including Southern Rhodesia, made financial contributions; the Congo Government, then cut off from Belgium, paid for their own locust officer, Hans Bredo. The British locust officer was Michelmore, who had already done considerable field research on the red locust.

During the war years these two men battled, with inadequate staff and equipment, to keep down the scourge. Their idea was to patrol the outbreak areas with African scouts looking for signs of an impending outbreak, then to make arrangements to destroy the locusts and retrieve the position. But their difficulties were insuperable; arsenic poison ran short at the wrong time, and the areas in which they worked were too remote to be able to gather together sufficient men after receiving warnings to be able to do much to prevent the locusts from escaping.

The first major attack on the locusts in the Rukwa Valley was made in 1945. Instead of the five tons of arsenical bait used the previous year, arrangements were

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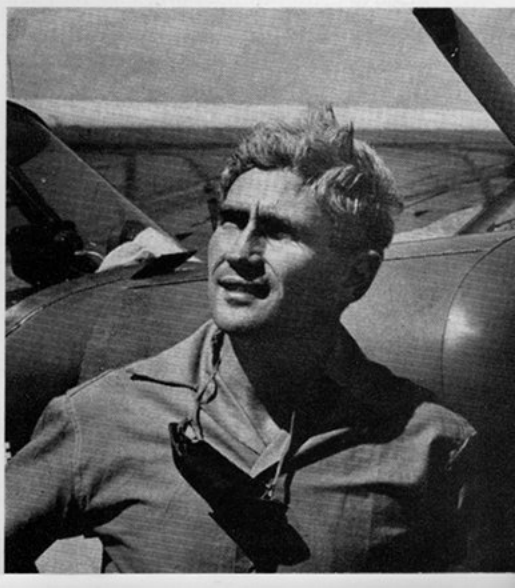
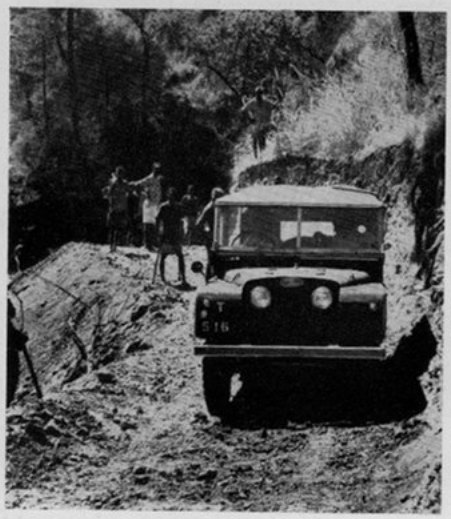
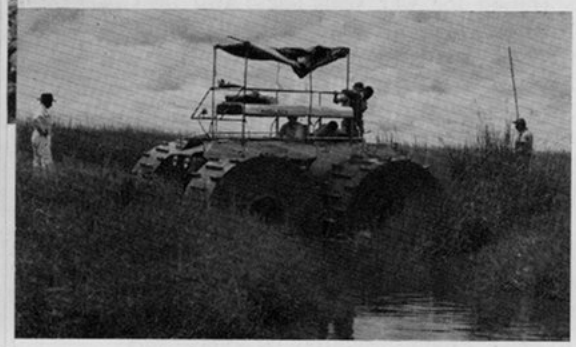


Right: *Pilot Robin Crosse-Upcott photographed before taking off to spray locusts. An anthropologist, with a doctorate, he prefers flying, but in his spare time studies the African tribes of Southern Tanganyika.*

Right: *An Auster sprays adult swarming locusts in the Rukwa Valley during the early days of aerial operations. Aircraft were rarely called in then, most of the control work being done from the ground.* **Below:** *to provide access to the valley from Abercorn, the Locust Control Service cut a road down the Muze Gap, on the escarpment. The road, a series of hairpin bends, winds precipitously down the mountain side to the flood plain below.*





Used for scouting, this Swamp Skipper, nicknamed "Mudlark", could negotiate the worst swamps and even floated in open water. It, too, has now been displaced by aircraft.

made to deliver by boat to Kapili, on Lake Tanganyika, 550 tons of flour for bait, ten tons of arsenite of soda for poison, and petrol and food that brought the total consignment to about 1,000 tons.

In early August, the deliveries from Kapili to Rukwa Valley began. The route to North Rukwa, although only 150 miles long, was mainly over terrain that no motor vehicles had used before; the nine lorries first climbed 2,500 feet up from Lake Tanganyika and then dropped a similar distance down the rocky Rukwa escarpment to Milumba camp. Despite enormous difficulties and innumerable breakdowns the 1,000 tons of stores were delivered, with a total mileage of 85,000 in 100 days.

This was a triumph, since it had been estimated that to get the stores to Rukwa with porters carrying the loads on their heads, 37,000 man-days would be required. As it was, the stores were in the valley before the rains broke. But still the demand for labour to carry out the campaign that followed delivery was described by the provincial administration as "apparently insatiable". For the Rukwa Valley campaign alone 250,000 man-days of labour were requested. In fact 2,380 men were drawn from a wide area of Tanganyika. And still the operations were inadequate. Even after baiting there were acres of immature locusts, known as hoppers, so dense that they were described as looking like "mats on the weighed-down grass."

Efforts to control the hoppers and swarms in the outbreak areas intensified during the following years until, in 1949, an international convention was signed by the original contributors to the scheme — Belgium, Britain and Southern Rhodesia — and by South Africa, who had given considerable help at various times. The following year the Portuguese adhered, which meant that every state in Africa, south of the equator, became a partner in the battle against the red locust.

New roads were cut into the outbreak areas, bridges built and even airfields constructed. More men and more vehicles became available, and new techniques to combat the locusts developed. Research started on locust population assessment and forecasting.

Recalling the earlier days of the operations, Karl Kuhne, administrative officer in Abercorn says: "The outbreak areas are all grass plains which flood during the wet season and which have either no outlet at all or only a very retarded outlet. These areas total several thousand square miles and range from Central Tanganyika into Northern Rhodesia.

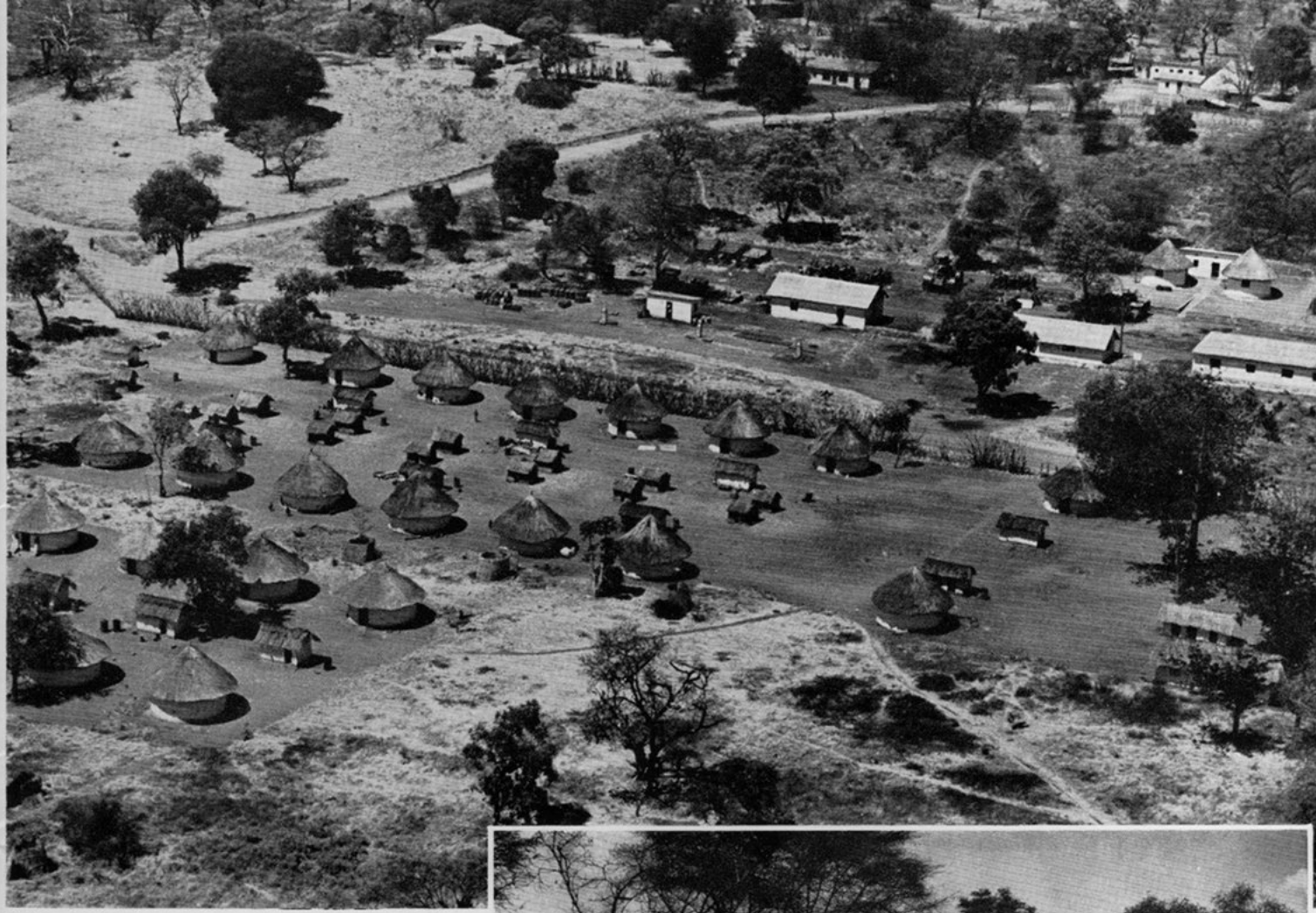
"The first job of the I.R.L.C.S. was to find out where the locusts were. This was done by pairs of African scouts, each pair responsible for about ten square miles. Over every few hundred square miles we had a European scouting officer, who checked, summarized and reported to headquarters in Abercorn. These reports showed where the control officers had to go with their teams of spraying and dusting machines and their insecticide.

"Sometimes the killing was easy and quick. But sometimes there was too much water and mud for machines to get about quickly; the work would then have to be done by hand-pumps which would have to be carried miles through water and mud, often neck-deep. Then there was the difficulty of getting close to the swarms without alarming them and chasing them miles away. When that did happen, of course, the swarms would have to be followed further — until they could be destroyed."

The service's principal scientific officer, Desmond Vesey-FitzGerald, who was awarded an M.B.E. for his services in the campaign against desert locusts in Arabia between 1942 and 1947, when he was seconded to the I.R.L.C.S., has seen the steady evolution of control methods.

"In the old days," he says, "panic spread before an advancing swarm. Everybody was mobilized; money was spent like water; tins were beaten in a desperate attempt to drive the locusts on to the neighbouring farm; and, most desperate of all, arsenical bait was spread on the land, scorching the herbage and menacing stock and game.

"The first great step forward was the introduction of safe insecticides; such as B.H.C. (benzene hexachloride). The earliest methods of using it were primitive, indeed. The apparatus consisted of a 'debe' (the four-gallon petrol tin that was once the universal utensil of Africa) and a grass



Above: *Muze base camp on the edge of the Rukwa plains, showing the European staff houses at the top, the workshops in the centre and the African staff houses in the foreground.* **Right:** *The landing strip at Muze. The tanks behind the Piper Cub contain insecticide, which is about to be fed into the belly tank under the aircraft.*

brush. A cigarette tinful of gammaxane (B.H.C.) was mixed with water in the debe and sloshed with the grass brush over the locust hopper bands.

"To do this between 1,000 and 2,000 labourers had to be recruited, housed, fed and transported to remote areas. The wild animals of the Rukwa Valley fled before this advancing army."

Then the locust war became mechanized; lorries and heavy tractors, mounting powerful spraying and dusting machines spread over the locust plains. But the attacking army was not always mobile — in the wet season the breeding grounds became a sea of mud and the adult locusts were too active to be reached by the ponderous machines.

Although the Service spent thousands of pounds building roads and bridges, Land-Rovers often had still to be wrapped in tarpaulins and floated across rivers. To permit scouting in marsh areas the Swamp Skipper was imported — a ponderous machine driven on four huge, hollow drums, each seven feet high and nearly four feet wide. These drums acted as wheels and had sufficient bouyancy to float the whole four-ton monster in water if necessary.

For the Service's field staff life was always eventful. On one occasion a buffalo charged a tractor on the Ikuu-Katisunga plain in the Rukwa; its horn caught in the wheel of a tractor and it fell dead with a broken neck.

Late one evening a control officer arrived at the camp of Mike Myburgh on the edge of the Mweru swamp and found him sitting in his Land-Rover some distance from his pole and dagga rondavel. The visitor soon saw the reason why: an elephant emerged from the bush, ambled up to the hut and began scratching his back against it — an action apparently performed habitually at six o'clock each evening.

On a Tanganyika plain one day control officer Leslie Wood left his Land-Rover to

examine some grass for locusts, but was charged by a buffalo. He dodged the main rush but was knocked down; the buffalo immediately tried goring him as he lay on the ground. A horn hooked Wood's shirt, and the buffalo then dragged him 15 yards, trying to shake the man off. It finally knelt on him before it was shot by a companion of Wood's who had seen the incident from the Land-Rover. Two days later Leslie Wood was back at work.

But by and large, though difficult, the work was a great success. Farmers in surrounding countries began to turn their attention to problems other than locusts, often ignorant of the day-and-night battle being waged on their behalf on the great flood plains.

Escaping swarms were rare, but occasionally they did occur. In 1954 a swarm covering 100 acres escaped from Rukwa Valley during a fire. The fire started from the hot exhaust manifold of a Land-Rover when a technical officer was driving through long grass. Destroying the Land-Rover — and very nearly the technical officer — the fire soon spread through 38,000 acres of dry grass, flushing out the locusts.

The swarm, numbering about 40,000,000 insects, was followed on foot by another technical officer for seven days — until his porters deserted. Meanwhile signals had been sent to Nairobi and Pretoria for help and two aircraft were sent to find and destroy the swarm from the air.

On numerous other occasions round-the-clock ground and air attacks have been necessary to contain the locusts. The planes proved so successful against the flying locusts that it was decided to adopt them permanently, and to use them against the hoppers as well. It was during one of the early aerial sprayings of hoppers that one of the pilots had a brush with a buffalo. Flying low over the grass, pilot Bill Breytenbach — now widely known as "Buffalo Bill" — saw a buffalo, which had been lying in the grass, rise up in front of him. The wheel of the plane was knocked off when it hit the buffalo, but the pilot managed to maintain control and, a little later, made a perfect landing on one wheel.

During the last year or two new emphasis has been placed on aerial spraying, and ground control relaxed. Now pilots have almost entirely replaced the scouts and ground control officers. This year the total staff consists of only 25 Europeans and 102 Africans. In February, 1952, it consisted of 47 temporary and permanent Europeans, and more than 1,400 temporary and permanent Africans. In 1952, with development at its peak, operations cost £285,000, while this year the budget is down to £102,320.

Has the red locust been beaten yet? "Emphatically, no," says the Director of the I.R.L.C.S., Charl du Plessis. "It is

Left: *Locust spraying from the back of a lorry. This could only be done where the ground was comparatively firm and smooth.* **Below:** *Typical wet-weather conditions on the Rukwa plains — a locust scouting camp.*

being contained in its outbreak areas, and that is all we can say. If we relaxed our efforts the danger of a new plague would be imminent. To destroy the red locust completely we should have to spray regularly for one year every inch of several thousand square miles. This might cost at a rough guess — since it is impractical, anyway — say £5,000,000.

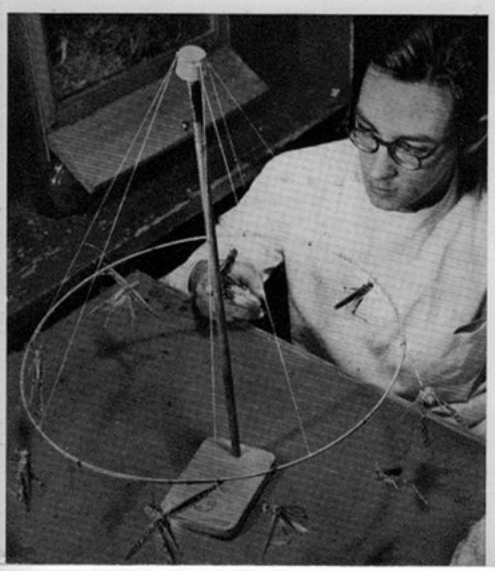
"And if any small pockets were left they could soon become a plague danger. Since each female in a year can produce 100 young locusts, it would not be long before there were many millions. And even if 100 per cent cover could be given, regular spraying would still be necessary, because the area would soon be invaded from non-outbreak areas, where locusts breed but never in sufficient numbers to cause a plague."

James Whellan, chief entomologist in the Federal Ministry of Agriculture and President of I.R.L.C.S., goes even further than this. He believes that we may be approaching yet another "danger period."

Before the I.R.L.C.S. came into existence, he declares, and at a time when control measures were virtually non-existent, a swarm-free period of 19 years, from 1910 to 1929, occurred. Since the end of the last plague, in 1944, 17 years have elapsed. He believes that if there is any pattern in the locust behaviour, a natural swarming tendency might manifest itself within the next few years. Though there is no evidence for such behaviour, it is a feature of many other insects, and it could apply to the red locust.

"We must therefore be on the alert, and ready to meet any threat," he says.

Today the work of the I.R.L.C.S. falls naturally into two parts. First, the continual reduction of the locust population in the outbreak areas, with the object of preventing swarms developing. And, second, studying the conditions in which the swarms are produced in the outbreak areas, with the object of so altering these conditions that there is no further risk of swarms being produced.

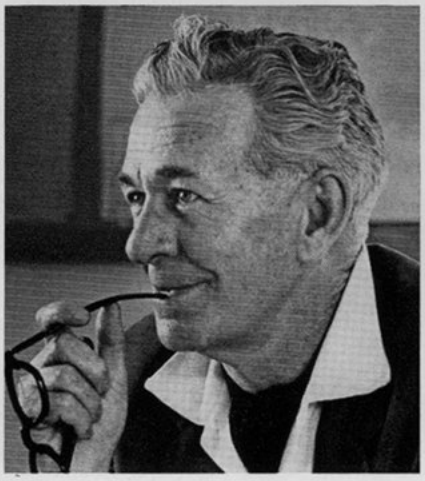


Scientists believe there must be something peculiar in the inter-relationship between the locusts, and their environment in the outbreak areas, which tends to cause swarming. If the nature of the peculiarity could be discovered, and if it could be modified sufficiently, perhaps the danger of the red locust could be eliminated for all time.

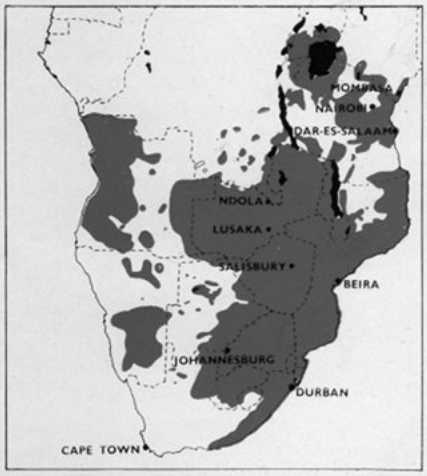
Several attempts to achieve this have already been tried. "The locusts will only breed where there are no trees," said the scientists, "so we will plant trees." This failed because to grow trees on the plains meant that more control was needed to protect the trees — mainly from fires — than was needed to control the population of locusts.

An attempt was made to ranch cattle in the Rukwa Valley in the hopes that their grazing would destroy the conditions favoured by the locusts for breeding. But cattle had the opposite effect.

Still the search continues. Desmond Vesey-FitzGerald is accumulating a vast store of knowledge about the ecology of the outbreak areas, studying the grasses and plants of the areas, the insects themselves and their predators, which are, most commonly, birds. Entomologist Claus Stortenbeker divides his time between the field and his laboratory, among other things examining the stomachs of thousands of locusts for parasites. "We have found several, but none that is likely to provide the final answer," he says.



Above: *Mr. Charl du Plessis, Director of the service, in his office at Abercorn.* **Left:** *Locust research is carried out not only in Central Africa, but in London as well. Here, at the Anti-Locust Research Centre, London, locusts are made to fly by suspending them from a wire frame hung from a central pivot. Feeling themselves suspended in air, the locusts begin to fly and turn the "roundabout". This gives an estimate of their speed and duration of flight. These specimens are desert locusts.*



During the great plague of the 1930's red locusts spread as far south as the Cape. The areas in which they were then breeding are shown here in red.

And meanwhile the development of control work continues. One of the principal functions of entomologist Godfrey Dean is the testing of new insecticides to find one that will do the work of the two now being used — D.N.C. (dinitro-ortho-cresol), a contact poison used for the fliers, and dieldrin, a stomach poison used for the hoppers.

In the I.R.L.C.S. laboratories in Abercorn, and at the Anti-Locust Research Centre in South Kensington, London, where thousands of locusts are bred every year, experiments are being carried out to learn more about the insect — such as why an increase in the number of locusts in the solitary phase (even in a cage) causes a change in their habits, colours and markings; in short, why they then enter the swarm phase.

These are some of the problems being tackled, and there are many others.

"We may achieve a break-through sometime, but it's not in view yet," says the Director, Charl du Plessis. "In the meantime it's a steady battle. The new independent governments of Africa, on whom we must to a large degree depend, are well aware of the locust danger. The Republic of the Congo has been invited to accede to the convention, and the Tanganyika Government, which obtained its independence in December, has already considered accession, but could not, of course, be committed before it actually had independence."

The international organization today is well served by a small but efficient team of administrators, technicians and scientists. It has for long prevented the locust ravages of past years, and is determined in the future gradually to improve on the situation.