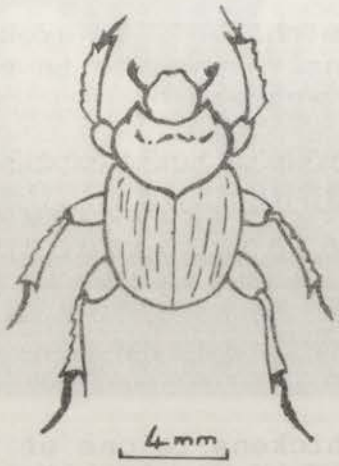
DUNG BEETLES

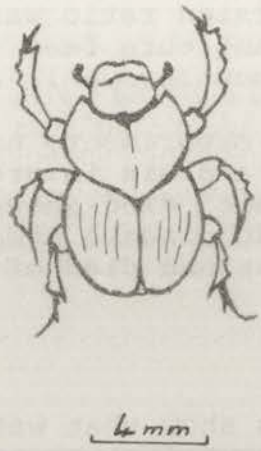
By E.S.C. Smith, Entomologist
Lowlands Agricultural Experiment Station, Keravat

INTRODUCTION

In areas like the African countries and India where cattle have been kept for thousands of years, most of the dung dropped by these animals is quickly buried by small insects called dung beetles. There are very many kinds of these beetles. Some are native to Papua New Guinea, and can often be seen burying pig or human droppings around villages, but these beetles cannot bury the large, wet dung pats of cattle. When cattle were introduced into Papua New Guinea (and Australia), none of the beetles which bury cow dung in other countries were present, and so cow dung lay on the soil for several months before rain, ants or termites (white ants) broke up the dung pats.



A native dung beetle often found burying pig droppings



An introduced dung beetle which buries cattle droppings

About ten years ago, some different kinds (species) of dung beetles were taken to Australia from Africa and, in 1973, four species were brought to Papua New Guinea.

RELEASES OF DUNG BEETLES IN PAPUA NEW GUINEA

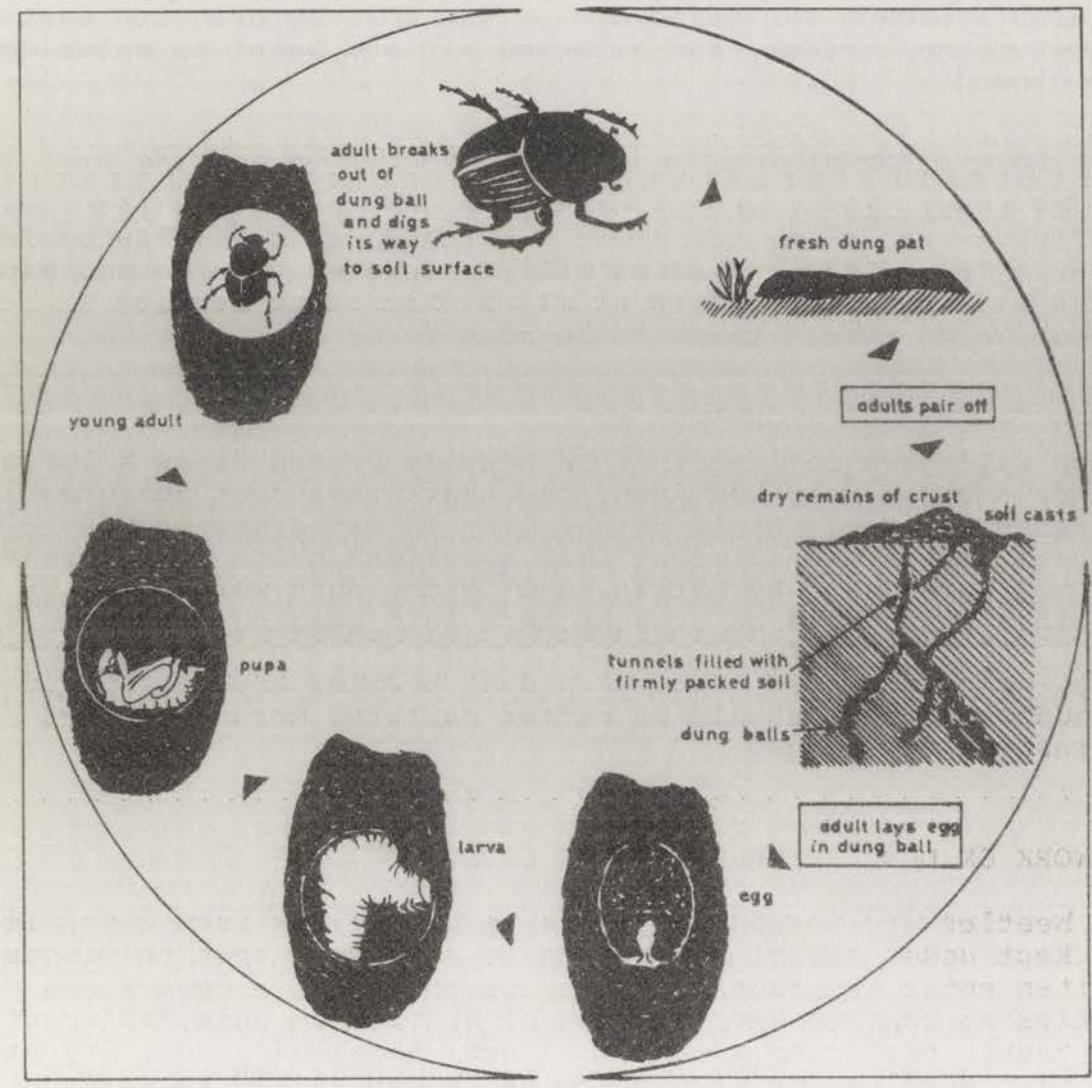
One of the four types introduced from Australia has been very successful and has been released in the East Sepik, New Ireland, East New Britain, Eastern Highlands, Madang, Morobe, Northern and Central Provinces, and is breeding in at least the last six of these Provinces. This species prefers an annual rainfall below about 1 750 mm (70 in), but if the soil is sandy or very well drained, it may breed in much wetter areas.

In 1976, another type which likes much wetter areas was brought from Australia and, a year later, was released in the Northern Province. This species is now breeding there and will be introduced to other suitable areas in Papua New Guinea.

LIFE CYCLE OF DUNG BEETLES

Both the adult beetles and the young stages feed only on dung, and will die if they cannot find dung to eat. The adults suck the juice from fresh dung, while the grubs feed on the dung balls buried by the adults. If the dung ball is broken open, the grub quickly dies.

The very successful dung beetle now breeding in the Markham Valley has the following life cycle. The adults meet and mate near a freshly dropped dung pat, and then dig holes into the soil beneath the pat. They carry dung 15-20 cm (6-10 in) down into the soil and form oval balls of dung about 1-2 cm (0.5-0.75 in) in length, in each of which the female lays an egg. Each pair of adults may produce 10-12 dung balls with eggs, all buried deep in the soil.



The life cycle stages of dung beetles. Taken from C.S.I.R.O. Rural Research *No. 75*

The eggs hatch into small grubs which eat the dung surrounding them, and after about 4 or 5 weeks the grubs begin to change into new adult beetles which dig to the surface and fly away to mate on a new dung pat. The whole life cycle from egg to egg takes about 6 weeks under lowland conditions, and possibly a little longer in the cooler highland regions. Some types of dung beetles may take longer to complete their life cycles, but the stages are basically the same.

WHY SHOULD WE INTRODUCE DUNG BEETLES

Dung beetles are very helpful to cattle owners because they:

Improve the fertility and structure of the soil

Most people know that cattle dung is very good for plant growth when dug into the soil in gardens. Dung contains a lot of nitrogen, and small amounts of other chemicals which are good food for plants, but if the dung remains on top of the soil, most of the nitrogen is lost in the air and cannot be used by the plants. The beetles, by burying dung 15-20 cm in the soil, place the nitrogen and other chemicals close to where the plant roots can use it. The digging by the beetles also improves the structure of the soil by bringing earth from below to the surface, and allowing air and water to enter deep into the ground.

Reduce the number of parasitic worms and fly pests which breed in the dung

For part of their lives, animal parasites and some flies (for example, buffalo fly) breed in the cow dung. If the dung is quickly buried, the number of parasites and flies will be lowered. We do not expect that there will be no parasites or flies where dung beetles are active, but we do expect there to be much fewer of them.

Prevent dung build up on the pasture

Cattle men will have noticed that in heavily grazed areas a lot of the ground is covered by cow dung, and that grass does not grow in these patches. Often, cattle do not like to eat grass growing close to dung pats either. This means that sometimes quite large areas of land are not being used by cattle, and if the dung was buried by beetles, this land could be brought back into grazing.

Therefore, we could expect that when dung beetles are introduced to cattle paddocks, there should be better pasture, more grass and fewer parasites and flies.

FURTHER WORK ON DUNG BEETLES IN THIS COUNTRY

When the beetles are introduced to Papua New Guinea from Australia, they are kept under strict quarantine to make sure that no diseases or parasites enter the country. We hope to bring in more kinds of dung beetles so that we have a range of beetles to suit different types of cattle producing areas (lowlands, highlands, wet, dry etc.). When the best beetles for each place are known, field releases will be made on cattle properties.

HOW TO RELEASE DUNG BEETLES ON CATTLE PROJECTS

Cattle owners should remember that build up of beetles is sometimes slow, and it may be one to two years after release before dung burial is easily noticed. Best results are usually found when the beetles are released:-

(a) At the beginning of the dry season;
(b) In a paddock which is fairly heavily grazed (has short grass);
(c) On areas where the soil is fairly sandy, or at least well drained;
(d) In areas close to stock yards or where there is fairly continuous grazing, so that there is a constant supply of fresh dung.

FURTHER INFORMATION

If you want to know more about dung beetles and what they do, you should contact the Department of Primary Industry Entomologist nearest you. The addresses of these officers are given below:

1. The Chief Entomologist,
   Department of Primary Industry,
   P.O. Box 2417,
   KONEDOBU, CENTRAL PROVINCE.

2. The Entomologist,
   Department of Primary Industry,
   P.O. Box 94,
   POPONDETTA, NORTHERN PROVINCE.

3. The Entomologist,
   Agriculture Research Centre,
   BUBIA,
   P.O. Box 348,
   LAE, MOROBE PROVINCE.

4. The Entomologist,
   Lowlands Agricultural Research Centre,
   KERAVAT, EAST NEW BRITAIN PROVINCE.

5. The Entomologist
   Kuk Tea Research Station
   P.O. Box 339,
   MT. HAGEN, WESTERN HIGHLANDS PROVINCE.