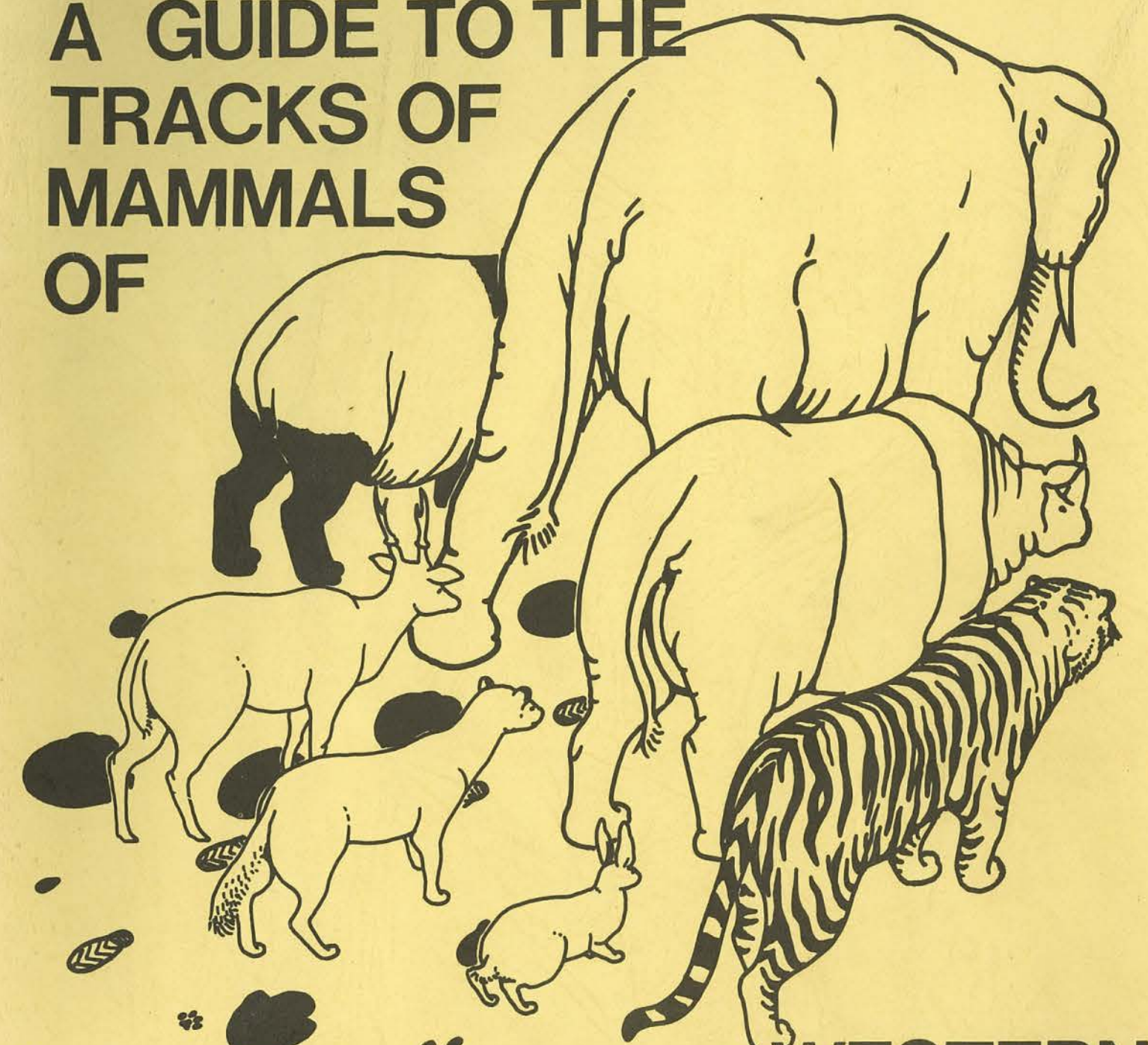


# A GUIDE TO THE TRACKS OF MAMMALS OF



**WESTERN  
INDONESIA**

**Nico J. van Strien**



*L. C. Rookmaker*  
*8/8/1984*

A GUIDE TO THE TRACKS  
of  
THE MAMMALS  
of  
WESTERN INDONESIA

Text and figures by  
drs. Nico J. van Strien

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SCHOOL OF ENVIRONMENTAL CONSERVATION  
MANAGEMENT - CIAWI, INDONESIA

## INTRODUCTION

This guide is designed to be an aid for the identification of the footprints of the larger mammals occurring in the western half of the Republic of Indonesia - Sumatra, Java, Borneo, Bali, Sulawesi (except the few marsupials found there) and the smaller surrounding islands.

For all those species whose tracks can be identified in the field an outline drawing of the print at normal size is given. If necessary both fore (F) and hind (H) feet are shown. For easy reference a drawing of the animal is also included.

Most of the figures are based on the author's extensive collection of plastercasts of footprints collected in Sumatra and Java, and on the plastercast collection in the Zoological Museum in Bogor.

For the few species that are not yet represented in the plastercast collections, the drawings of the print are composed from figures in the literature or from dry skins in the Bogor museum.

All prints shown are of about average size; when using this guide one should be aware of the considerable variation in size of prints made by individuals of the same species (See the tiger prints on page 26). Tracks of juveniles can be distinguished from the full-sized prints of adults, which are often found in the same place, but there is considerable individual variation between adults and sometimes overlap in sizes between related species, which can cause difficulties in identification.

Often prints that are smaller or larger than the ones figured will be found, and for identification one should not only rely on the differences in size, but also on the often subtle, differences in shape.



### THE STUDY OF ANIMAL TRACKS.

The study of footprints and other signs is an important part of most faunal surveys. Most mammals and other larger animals are shy and avoid people and they are very difficult to observe in the dense tropical vegetation. Many species are nocturnal, hiding during the hours of daylight and only leaving their shelters at night. To study the occurrence and distribution of most species one has to rely often on indirect evidence such as tracks, scats, feeding marks etc. Some of these signs are very specific and can undoubtedly be attributed to a particular species, others are less so, indicating the presence of one of a number of related or similar species.

Footprints (= the imprint in the soil left by one foot) and tracks (= a series of footprints of one animal) are among the more specific signs left by animals in the field. Among the larger species there are only few that cannot be identified with certainty on the characteristics of their footprints, provided that the prints are clear and sharp. Unfortunately good prints are relatively rare and not always easy to find, especially in the humid tropical forest where the soil is covered with a thick layer of plant matter and where the frequent rains wash out the prints. Many species are also mainly arboreal, descending only rarely to the ground and thus seldom leaving footprints. But for many species eg. rhino, tapir, tiger one is much more likely to encounter identifiable tracks than the animal itself.

Good places for looking for footprints are sand or clay banks along rivers and streams, where the animals have crossed or come to drink. Muddy places along trails and roads, around wallows and saltlicks and new logging-roads are also good places to search for tracks. Tracks of many arboreal animals can also be found on logging-roads because the animals are forced to descend to cross wide gaps in the canopy.

Identifying tracks in the field is not easy for many species. The light is usually dim in the places where tracks can be found and it is difficult to see the fine details. Good prints are often found in muddy places where it is difficult to inspect them at close range, or to take reliable measurements. It will often be necessary to preserve the tracks for further study and to confirm the identification, especially when it concerns rare species or unexpected finds.

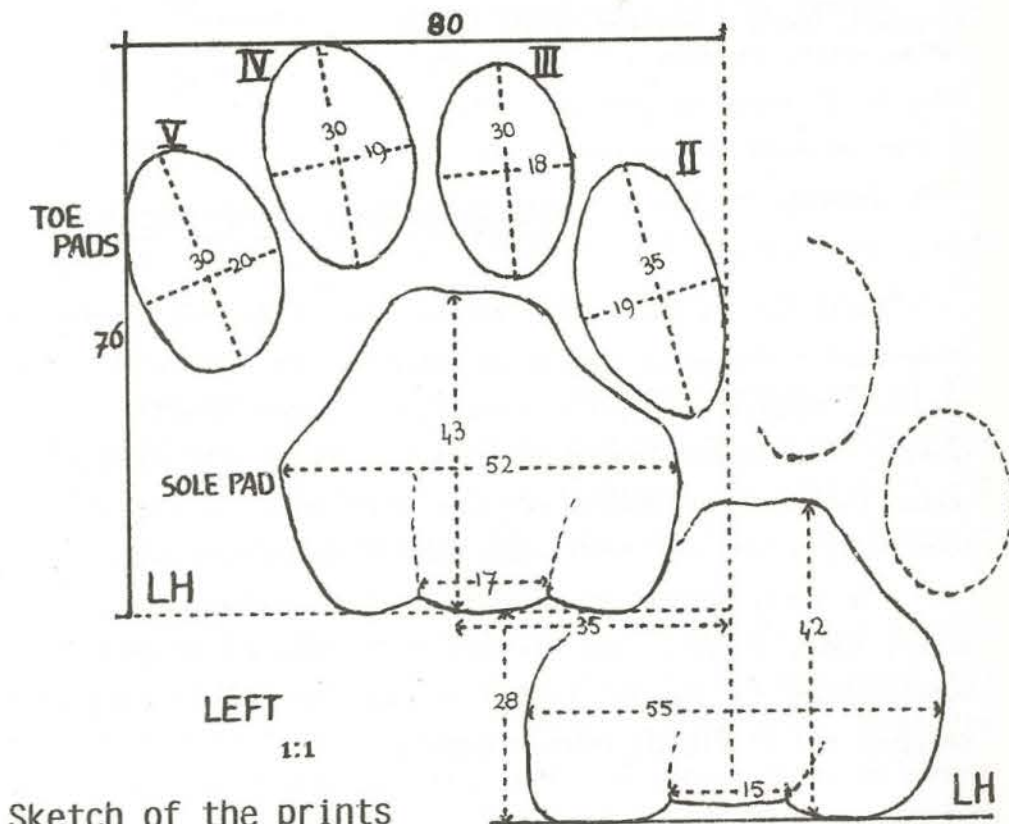
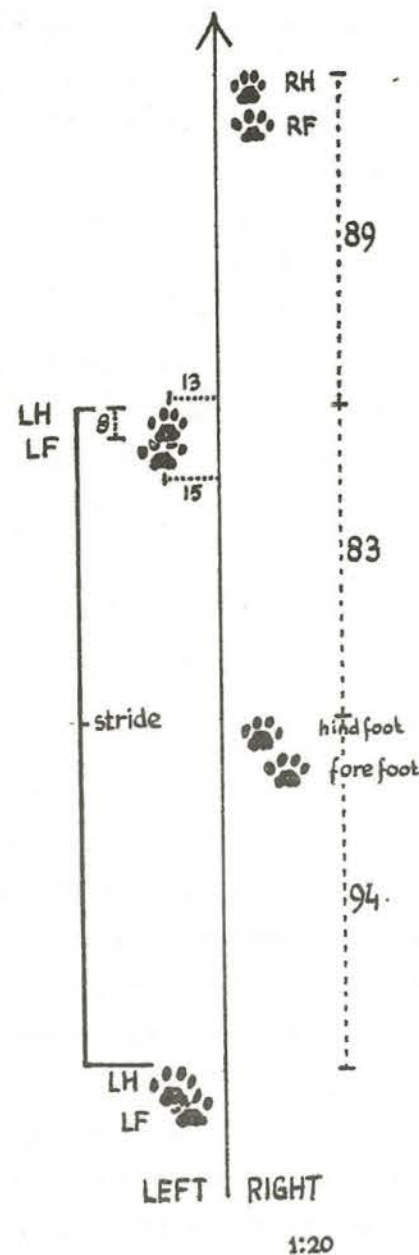
By far the best way to preserve tracks is by making casts with plaster of Paris (Gypsum). A cast is not only the most complete and accurate way of preserving a print, but it also greatly facilitates the study and identification of the track. A print in soil is a negative of the foot of the animal, and by making a cast of the print a likeness of the actual foot of the animal is obtained. A cast can be easily compared with museum specimens and with other casts. Also measurements can be made much more easily and accurately on the hard convex surface of a cast than on the soft concave surface of the print. Casts often show details that are unnoticeable in the print, like the skin structure of the sole or the faint imprints of nails.

Most of the records of mammals that appear in reports and publications concerning tropical forest areas are based on the identification of footprints and other sign, and therefore the making of plastercasts should be a standard procedure in each faunal survey. With the help of casts more species can be identified and a good cast can be accepted as proof of the correctness of a record that otherwise might be regarded as doubtful.

If plaster is not available to make a cast, one can make drawings or photographs. Photos or slides are easily and quickly made, but the results are often disappointing because of the lack of depth. Even very clear prints can turn out to be hardly visible on a photograph. The distinctness is much improved by applying flashlight from the side so that shades are cast in the print. Always photograph prints together with a ruler or an object of known size.

Drawings are most easily made on millimetre-paper. After the key-points of the print are measured and positioned on the paper with a ruler or a pair of compasses, the outline is sketched. Drawings of a single print should be made to scale, drawings of a section of a track can be reduced as appropriate.

Sketch of the track



Sketch of the prints



From animal tracks not only the species can be deduced, but sometimes also the sex and age of the animal. For some of the larger mammals it is even possible to recognise individual animals on the size and form of their prints, in the same way as individual people can be recognized by their finger prints. This is a valuable tool for studies of elusive and rare animals in habitats where direct observation is very difficult.

This technique has been successfully applied in the author's study on the rare and endangered Sumatran Rhinoceros in the Gunung Leuser National Park in Sumatra. In more than four years of fieldwork some 800 casts were collected, made by about 40 different rhinos, which could be recognised individually on the size and shape of the foot and hoofs. By plotting the tracks of the different rhinos on maps much could be learned about the distribution and density of the rhino population, and comparison of the different age and sex groups that could be recognized gave valuable data on reproduction and the structure of the population.

Similar results have been obtained in studies on tiger in India, using outline drawings of prints, made on a transparent screen placed over the print. Outline drawings may be sufficient for recognising tigers, which have rather large and shallow prints, but for other animals, especially ungulates that have deep imprints with a strong profile, this technique is less applicable. It is also less practical in the moist forest, where light is dim and the screen becomes blurred when placed close to the soil. In general better results will be obtained using casts. Species other than rhino and tiger for which study of tracks can give valuable information include tapir, elephant, leopard and the larger bovids.

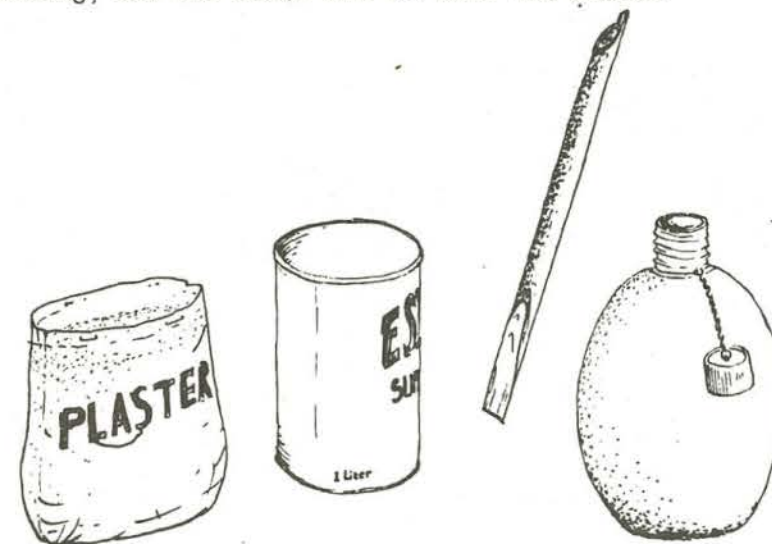
#### THE MAKING OF PLASTERCASTS.

Casts can be made with several substances, but plaster of Paris or Gypsum is the most convenient material to use. It is cheap and easy to work with and the cast is durable. Plaster of Paris consists of hydrated calcium sulphate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ). The mineral is ground to a powder, refined and heated to drive out the crystalline water. When the powder is mixed with water the water molecules combine again with the calcium sulphate crystals and the mixture hardens to a fine and moderately hard chalklike substance.

The best qualities of gypsum are those sold for dentistry work. It hardens fast and gives strong casts of very fine texture. It is supplied in convenient one kilogram packs by dental supply stores for Rp 300 to 500 per kg. The plaster supplied by druggists for medical use is cheaper, but of slightly inferior quality.

Hardening time depends on the temperature and the amount of water in the mixture, and some heat is produced by the reaction. Normally the plaster starts to set after 1 or 2 minutes and it is completely hardened after 15 to 30 minutes. The heat produced by the reaction can be felt and after the cast has cooled again the hardening is complete.

Plaster should be kept in a strong plastic bag or in a jar or tin with a wide mouth, and care should be given to keeping it dry. A few drops of water can make a large amount of plaster useless. In principle damp and partially hardened plaster can be revived by pounding and heating, but the casts will be soft and coarse.



PLASTER + EMPTY TIN + STIRRING ROD + WATER

#### Equipment for making the casts

To mix the plaster an old tin or other receptacle, large enough to hold the mixture and to allow vigorous stirring, should be provided. Mixing can be done with the fingers or with a stick cut to a convenient length. It is easiest to add the plaster first, and then gradually add water (fresh water, preferably no sea water), stirring vigorously until the mixture has the right consistency and is smooth. The time before the mixture starts setting is very limited, at most 2 minutes, and it is important to work quickly

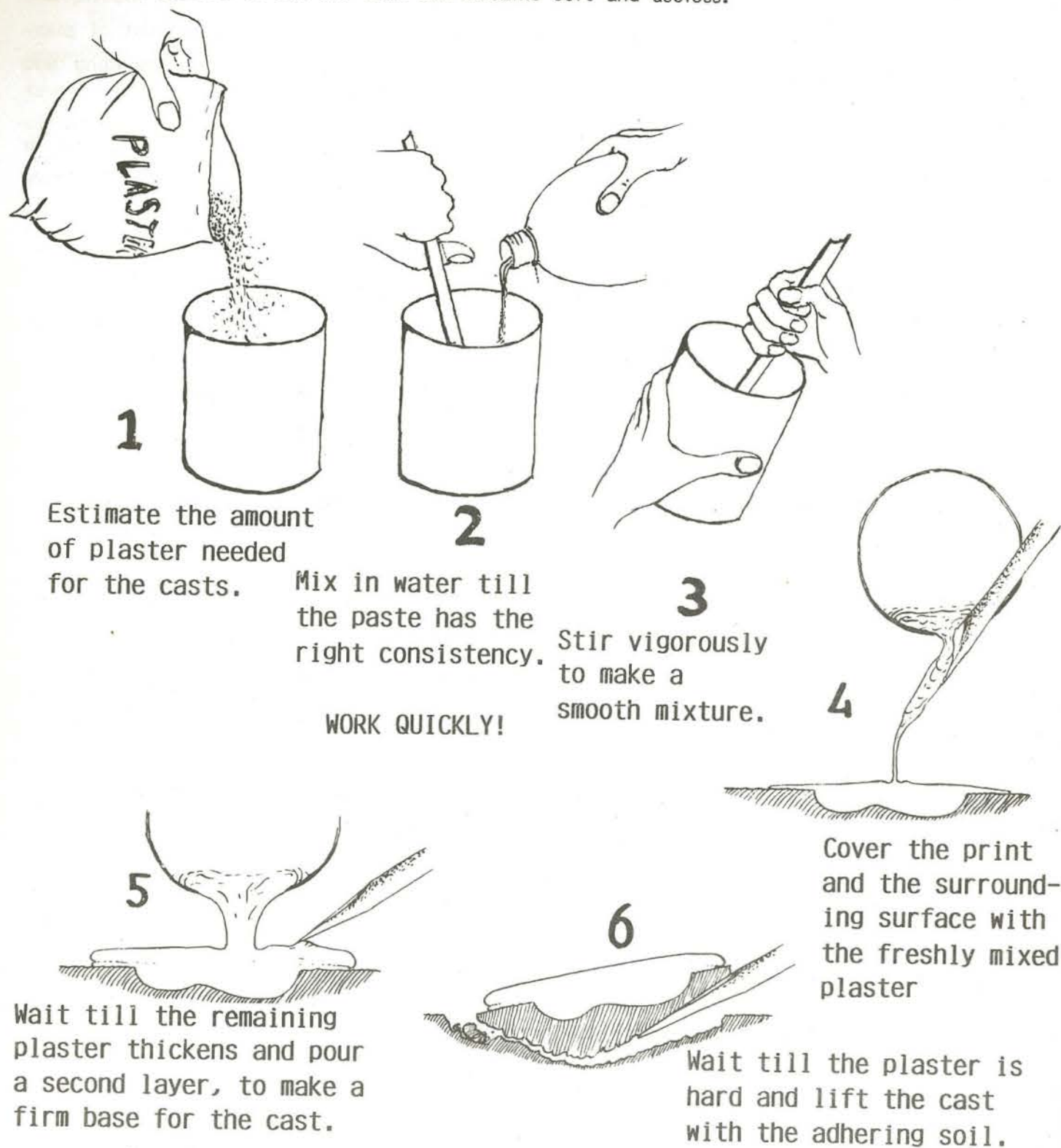
and to have everything ready before the plaster is mixed. The prints should be cleaned, there should be enough water at hand (also for cleaning the mixing tin) and the tin and mixing tool should be ready. Water can be taken from a drinking flask or from a nearby stream, pool or puddle.

Some experience is needed to judge the right amount and the right consistency of the plaster mixture. It is better to start with mixing too little plaster, as more can always be made later. Once mixed plaster must be used within minutes, so excess quantities are wasted. Mixing of the plaster should be done as quickly as possible because the reactions start with the first drop of water added.

Water should be added till the mixture has the consistency of a thin batter. After stirring vigorously for a few seconds, part is immediately poured into the print and in a thin layer over the surrounding soil, letting the mixture flow along the mixing stick into the print. When the remaining mixture has become so thick that it will not flow freely, a second layer is poured on the back of the cast to form a thick base.

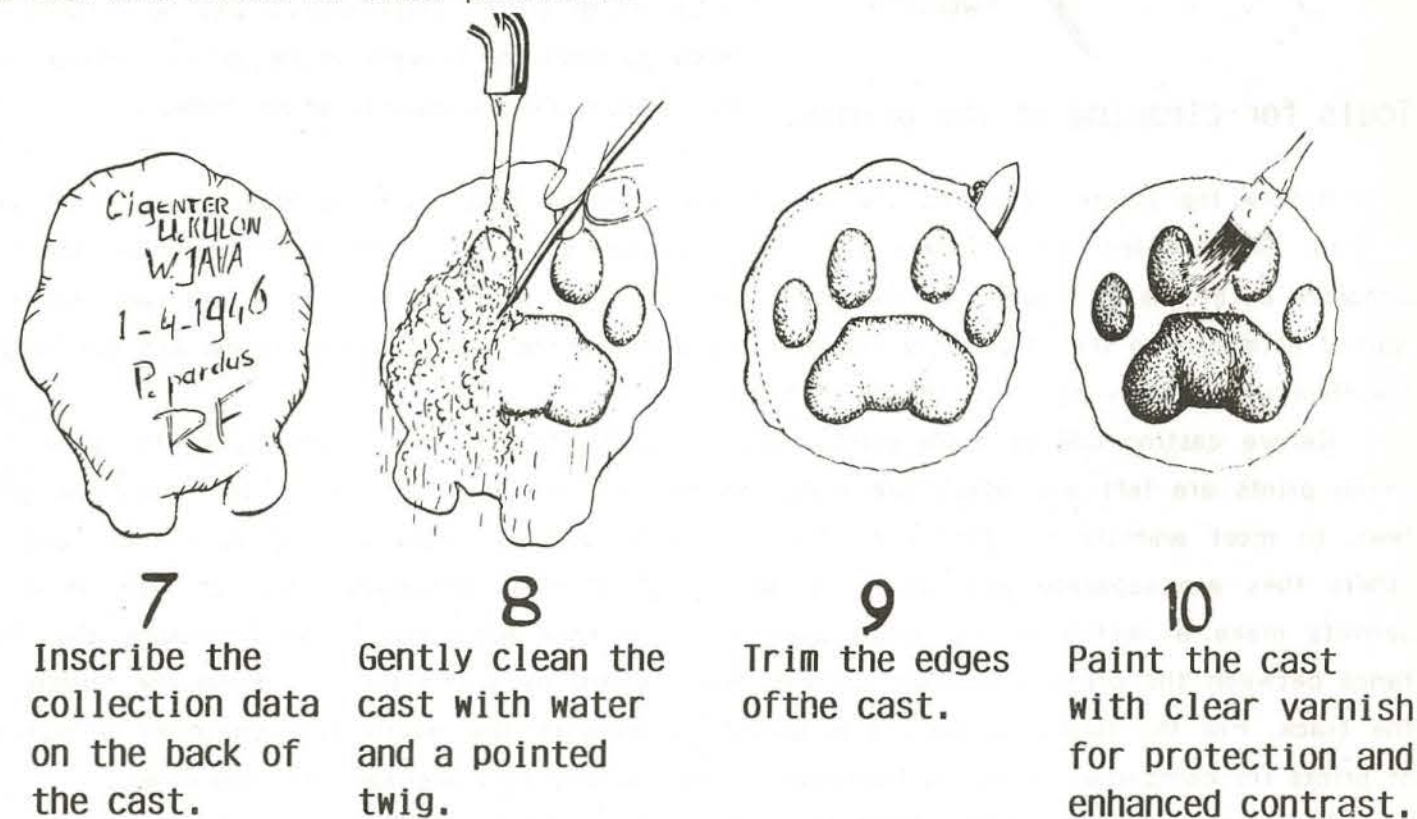


When too much water has been added the mixture will harden only after a very long time or not at all. In this case it is better to make a new mixture. With too little water the mixture will be too thick and viscous and air bubbles will remain in the smaller crevices of the print, obscuring detail. In this case more water should be added quickly. If water is added after the mixture has started to set the cast will become soft and useless.



After the cast has hardened the soil around the cast is loosened and the cast with the adhering soil is carefully lifted, if necessary using a knife as lever. Then the adhering soil is washed off, using the fingertips and a twig for cleaning the crevices. Do not use a hard brush because it will scratch the surface of the cast. For transport the cast is wrapped in leaves, paper or plastic. Before the cast is lifted a collection number or the collecting data (Date, place, species etc.) should be scratched in the plaster on the back of the cast.

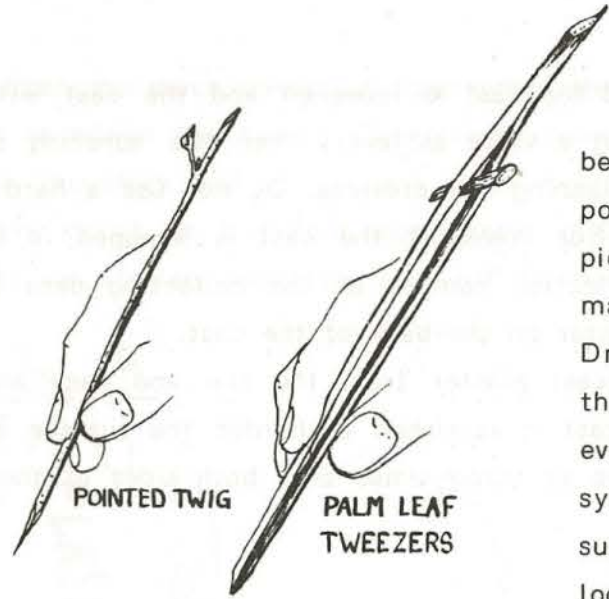
Later the cast is fashioned by scraping excess plaster from the rim and base and the cast is thoroughly dried in the sun. Finally the cast is varnished to harden the surface and to enhance contrasts. Brush ordinary clear varnish two or three times over both sides of the cast, the first time thinned for better penetration.



CLEANING AND SELECTION OF THE PRINTS.

Before a print can be cast it needs cleaning. Soil particles, leaves or other debris have usually fallen into the print from the loose top layer of the soil. In older prints insects may have taken shelter or spiders may have made webs. Before a good cast can be made these objects should carefully be removed without damaging or deforming the print.





In prints of large animals these objects can be picked out with the fingers, for smaller prints a pointed twig may be used. To pick out the finest pieces a forceps might be needed, that can be made from a twig or from a stalk of a palm leaf. Dry dust can be blown out, taking care not to get the dust in the eyes. In hard sticky clay one can even use water to wash out the prints, using an old syringe to pump out the water. The immediate surroundings of the print should also be cleaned of loose particles to prevent more debris falling into the print while the cast is being made.

**Tools for cleaning of the prints.**

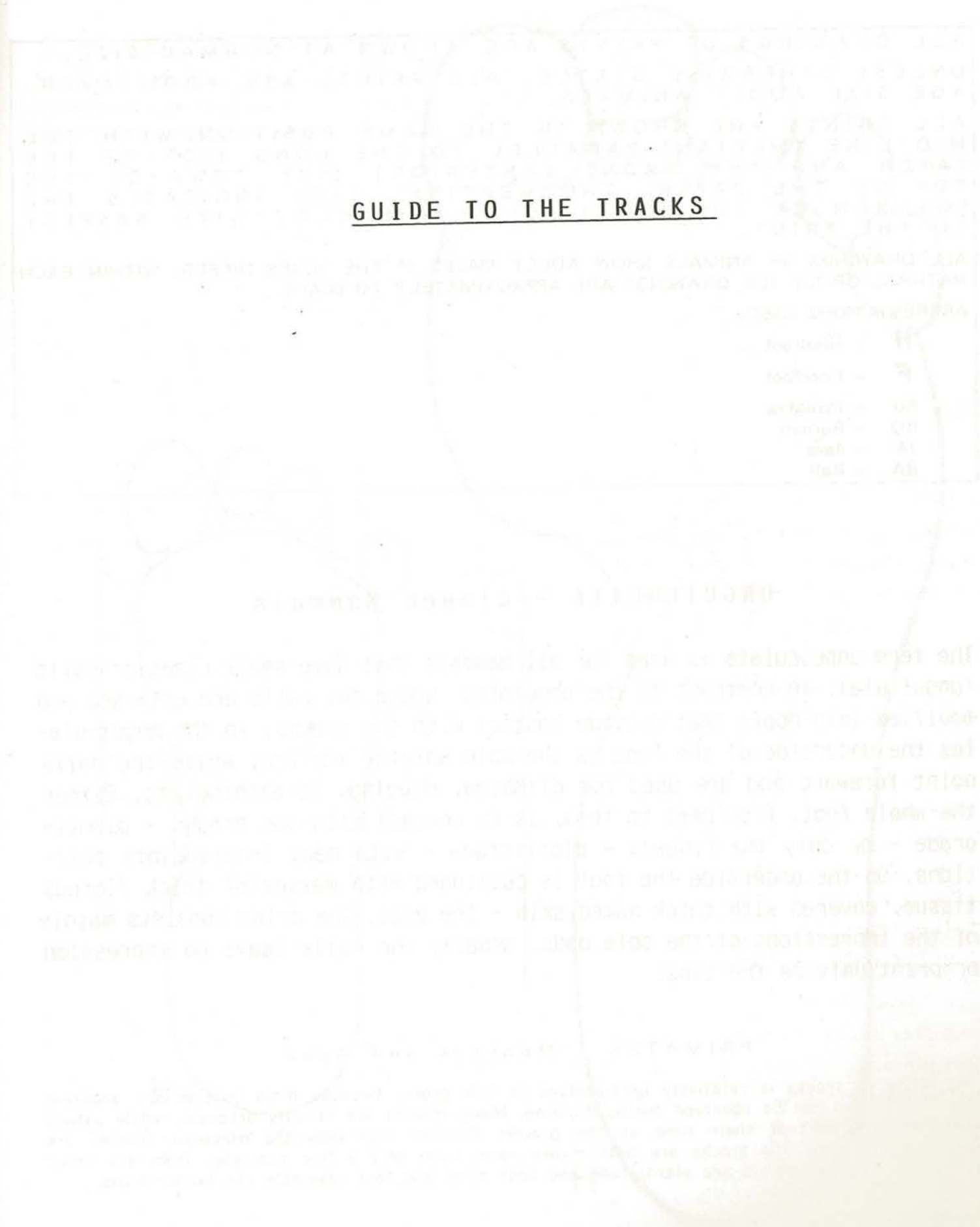
Before the plaster is mixed the prints that will be cast must be selected, cleaned and marked. Select sharp and complete prints, which show all parts of the foot, and that are not distorted by stones or treeroots. Take care that the outer parts of the prints are cast and pay special attention to the often very vague impressions of the claws of carnivores. Do not forget the thumb in monkey prints or the small hoofs of the pigs.

Before casting one or more prints, take a careful look at the whole track, to determine which prints are left and which are right, which are from the fore and which from the hind feet. In most animals the prints of the hind feet overlap those of the fore feet, but in others they are separate and they are usually of slightly different shape or size. If time permits make a sketch of the track over three or four successive prints. Measure the distance between the prints and their position with regard to a straight line along the middle of the track. For the larger animals it is useful to measure the width and length of a number of prints for comparison with the literature, where usually only average sizes are given.

If there is enough plaster more than one cast should be made from each track, because it can be difficult to judge the quality and completeness of a print in the soil, and one cast rarely shows all important characteristics with sufficient clarity. Whenever possible make casts of both fore and hind feet.

Tracks of the same animal in different soils may appear to be rather different. In coarse sand they appear much larger and the details of the form are not visible. Deep prints in soft soils are often unusually small and sharp because of the sagging in of the sides. If one intends to make a reference collection of casts it is useful to make casts from tracks made in different soils and under different conditions.

GUIDE TO THE TRACKS





ALL DRAWINGS OF PRINTS ARE SHOWN AT NORMAL SIZE. UNLESS OTHERWISE STATED, ALL PRINTS ARE FROM AVERAGE SIZE ADULT ANIMALS.

ALL PRINTS ARE SHOWN IN THE SAME POSITION WITH THE MID LINE (MEDIAN) PARALLEL TO THE LONG SIDE OF THE PAPER AND THE FRONT (ANTERIOR) SIDE TOWARDS THE TOP OF THE PAPER. THE VERTICAL LINE INDICATES THE POSITION OF THE MID LINE OF THE BODY WITH RESPECT TO THE PRINT.

ALL DRAWINGS OF ANIMALS SHOW ADULT MALES IF THE SEXES DIFFER. WITHIN EACH NATURAL GROUP THE DRAWINGS ARE APPROXIMATELY TO SCALE.

ABBREVIATIONS USED:

- H** = Hindfoot
- F** = Forefoot
- SU = Sumatra
- BO = Borneo
- JA = Java
- BA = Bali

### UNGUICULATA - Clawed Mammals

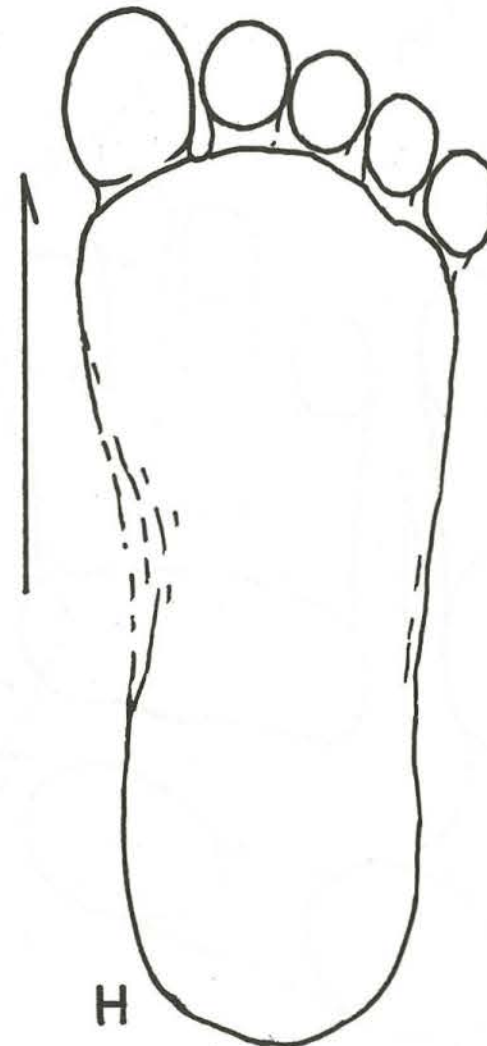
The term unguiculata is used for all mammals that have small claws or nails (unguicula), in contrast to the ungulates, where the nails are enlarged and modified into hoofs that provide contact with the ground. In the unguiculates the underside of the foot is the main walking surface, while the nails point forward and are used for climbing, digging, scratching etc. Either the whole foot, from heel to toes, is in contact with the ground - plantigrade - or only the fingers - digitigrade - with many intermediate positions. On the underside the foot is cushioned with masses of thick fibrous tissue, covered with thick naked skin - the pads. The print consists mainly of the impressions of the sole pads, usually the nails leave no impression or print only as the tips.

### PRIMATES - Monkeys and Apes

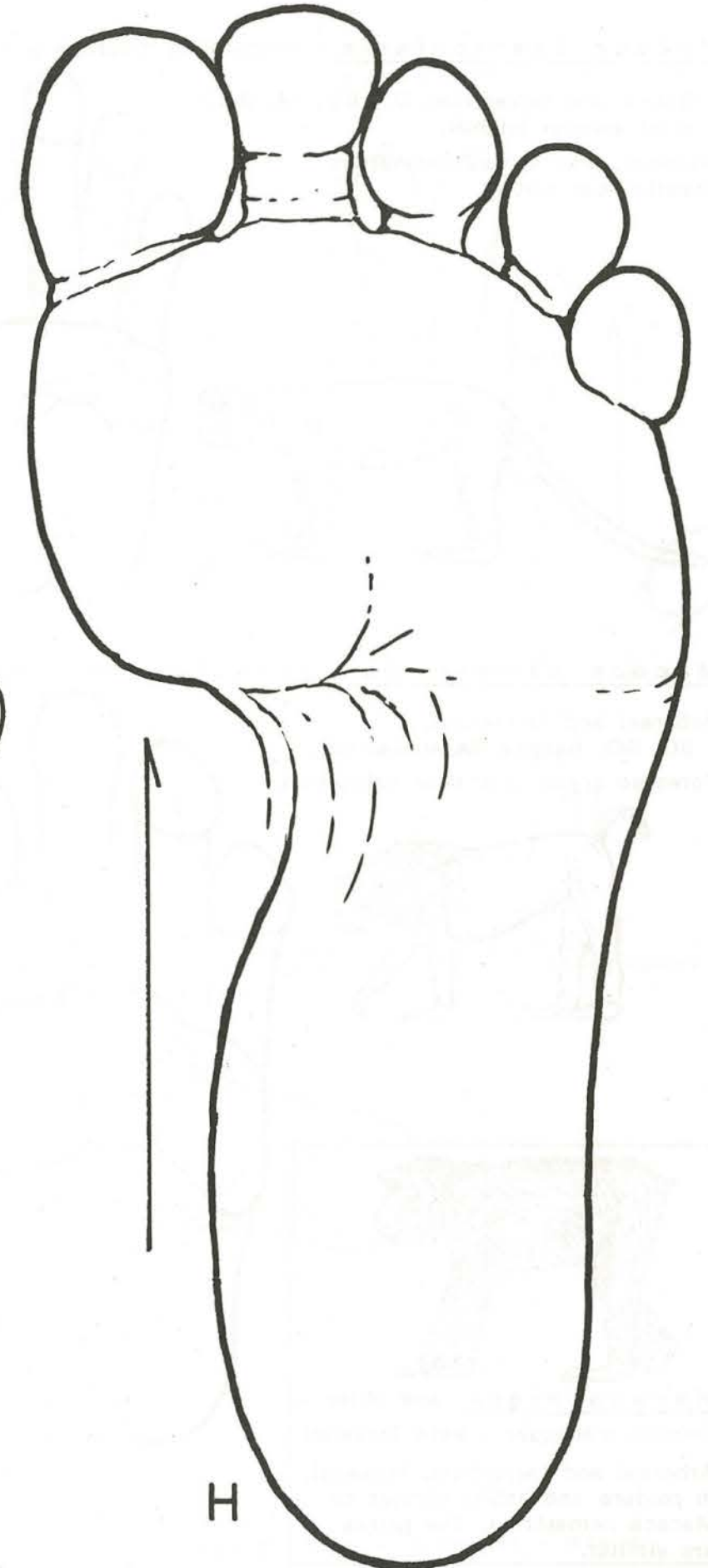
The study of tracks is relatively unimportant in this group, because most species are arboreal and diurnal and can be observed during daytime. Many species are strictly arboreal, while others spend a large part of their time on the ground. Besides man only the macaque species are largely terrestrial. The tracks are both shown here, with only a few examples from the other primate species. Monkeys are plantigrade and both hand and foot resemble the human hand.

### Homo sapiens - man - orang

Terrestrial. Throughout the area. Exceedingly common, even in the remotest areas.



juvenile (1½ y.) male

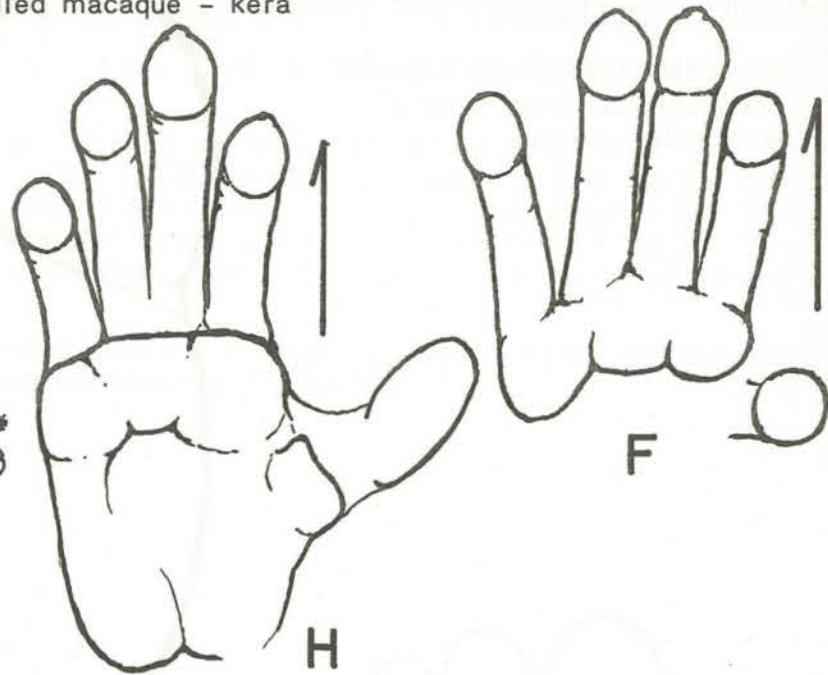
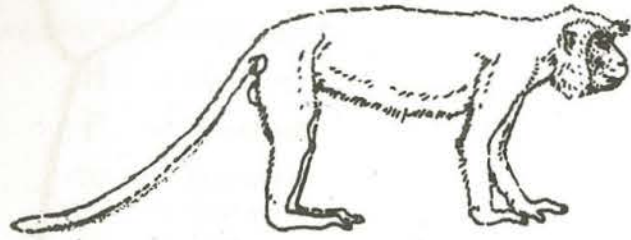


adult male



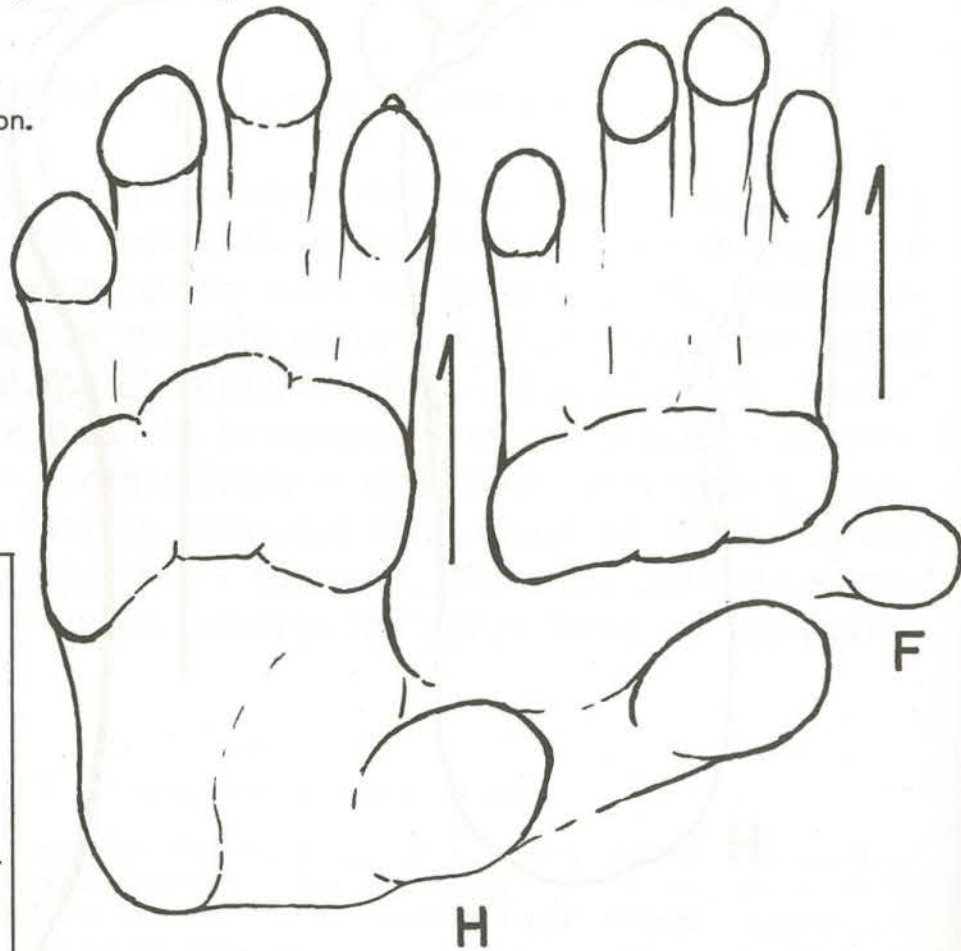
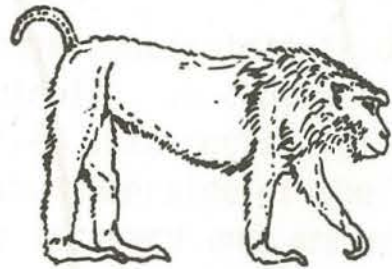
**Macaca fascicularis** - long-tailed macaque - kera

Arboreal and terrestrial. SU, BO, JA, BA,  
most smaller islands.  
Common, also around habitation.  
Usually near water



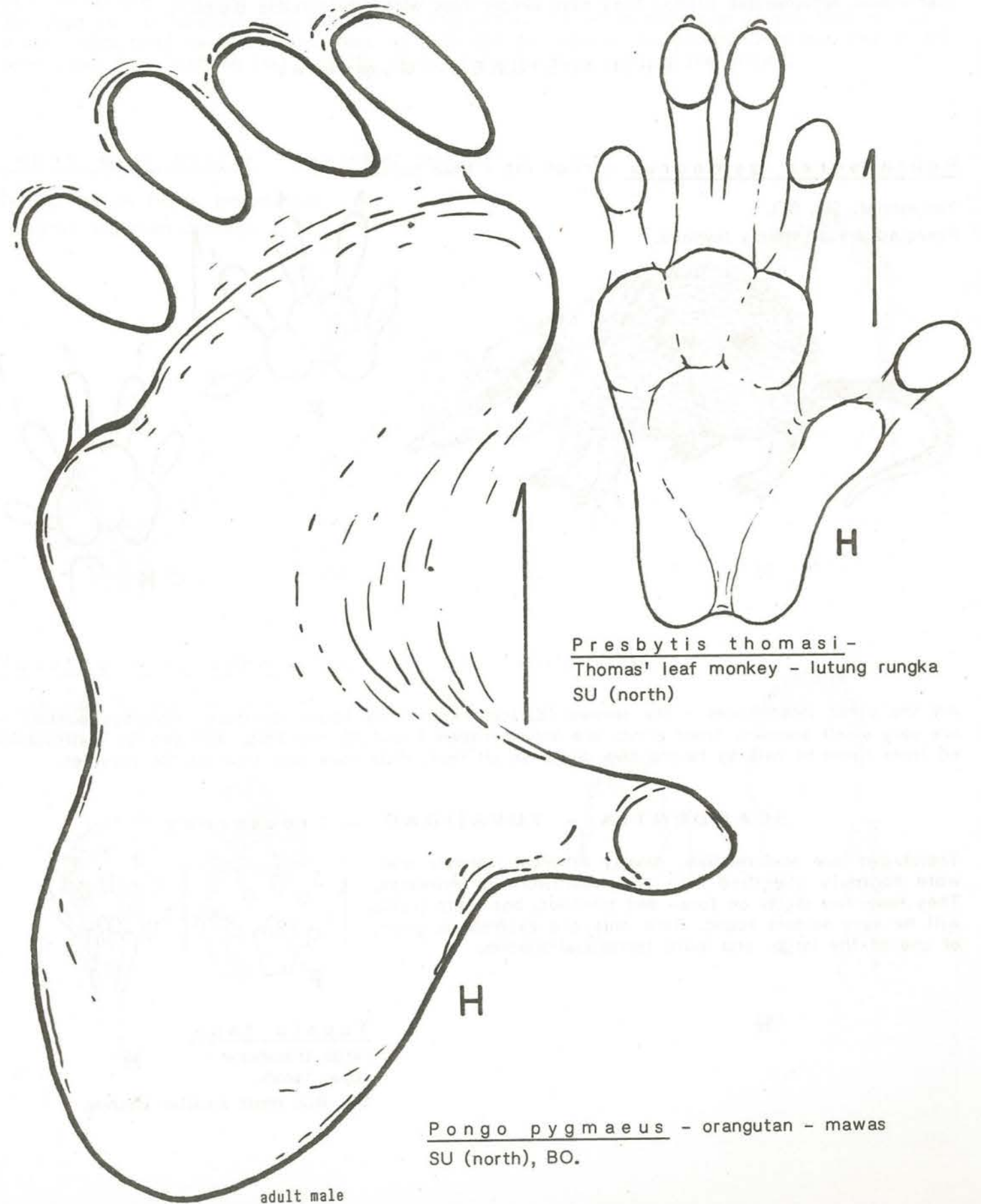
**Macaca nemestrina** - pig-tailed macaque - beruk

Arboreal and terrestrial.  
SU, BO, Bangka, Mentawai isls.  
Forested areas, also near habitation.



**Macaca nigra** and allies -  
Celebes macaques - kera Sulawesi  
Arboreal and terrestrial. Sulawesi.  
In posture and habits similar to  
Macaca nemestrina. The prints  
are similar.

Two examples of footprints of arboreal primates. Prints like these can occasionally be found at saltlicks or on muddy river banks, where the animals have come down to drink or to eat mud.



**Presbytis thomasi** -  
Thomas' leaf monkey - lutung rungsa  
SU (north)

**Pongo pygmaeus** - orangutan - mawas  
SU (north), BO.



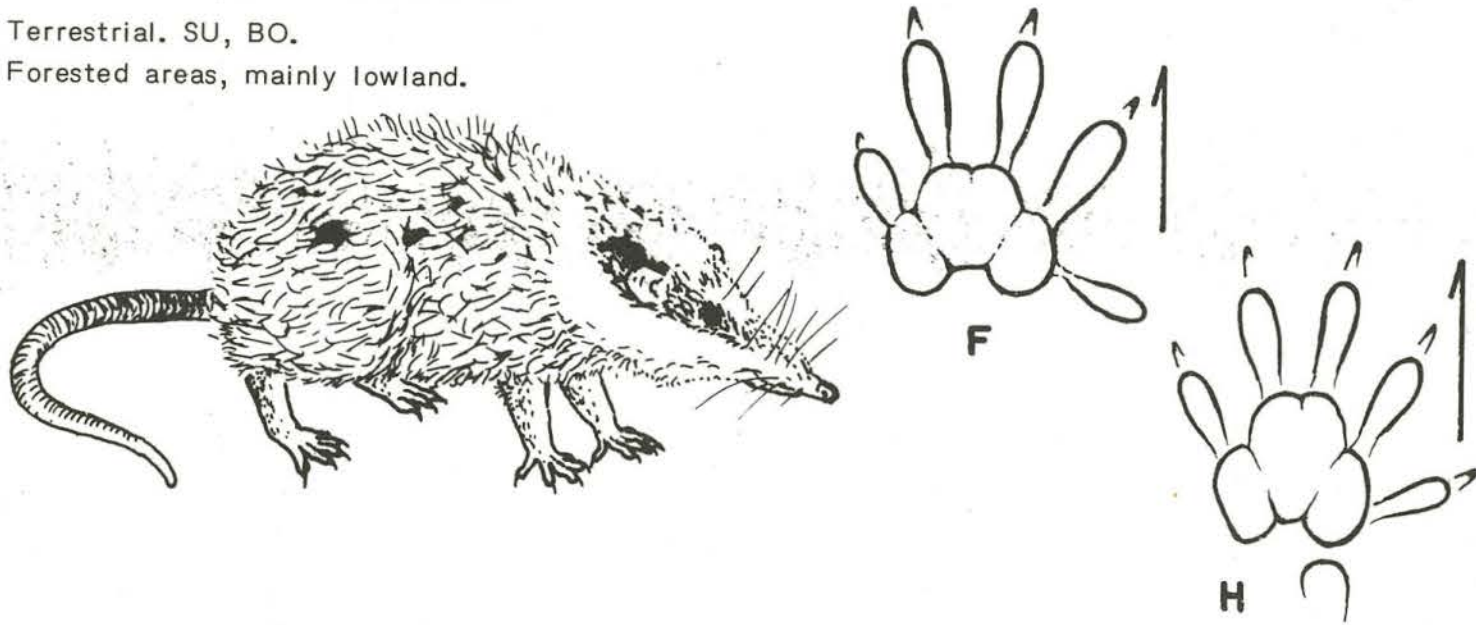
**INSECTIVORA - Insect-eating mammals**

Most insectivora are small to very small squirrel- and rat-like animals. There is only one species that makes recognizable prints. They have simple feet with five flexible digits.

**ERINACEIDAE - Gymnures**

**Echinosorex gymnurus - moon rat - tikus bulan**

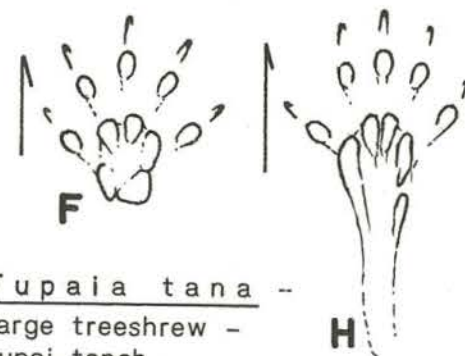
Terrestrial. SU, BO.  
Forested areas, mainly lowland.



All the other insectivores - the shrews (Soricidae) and the lesser gymnure (Hylomys suillus) - are very small animals. Their prints are only between 5 and 10 mm long, and can be distinguished from those of rats by having five digits on all feet. Rats have only four on the forefeet.

**SCANDENTIA - TUPAIIDAE - Treeshrews**

Treeshrews are squirrel-like, mostly arboreal, animals that were formerly classified with the Insectivora or Primates. They have five digits on fore- and hindfeet, but their tracks will be very seldom found. Here only one example is given, of one of the larger and more terrestrial species.



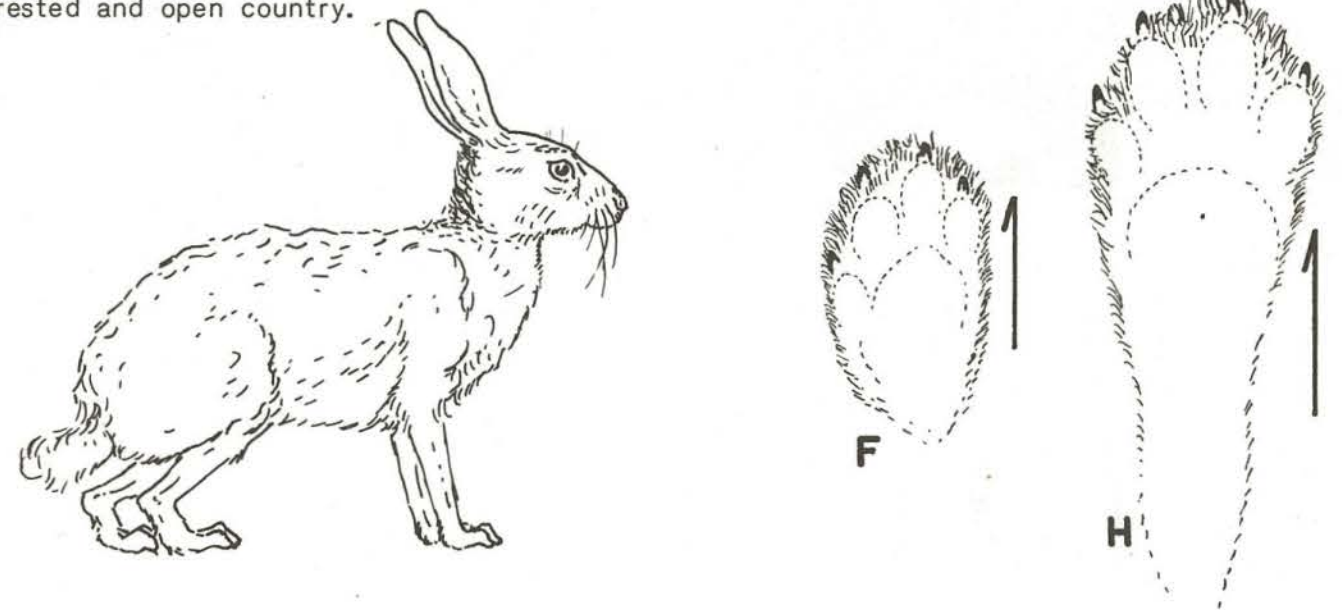
**Tupaia tana - large treeshrew - tupai tanah.  
SU, BO, most smaller islands.**

**LAGOMORPHA - LEPORIDAE - Hares and Rabbits**

The hindfeet are long and the forefeet short, both with four digits with short claws. The small fifth digit on the forefoot does not show in the prints. The whole underside of the feet is covered with thick felty hairs and therefore no pads can be seen in the prints. Only the tips of the claws show. When walking fast only the digits of the hindfeet contact the ground.

**Lepus nigricollis - black-naped hare - kelinci Jawa**

Terrestrial. JA (west, introduced)  
Forested and open country.



**Nesolagus netscheri - Sumatran rabbit - kelinci Sumatra**

Terrestrial. SU (central, south)  
Mountain forest, probably rare.



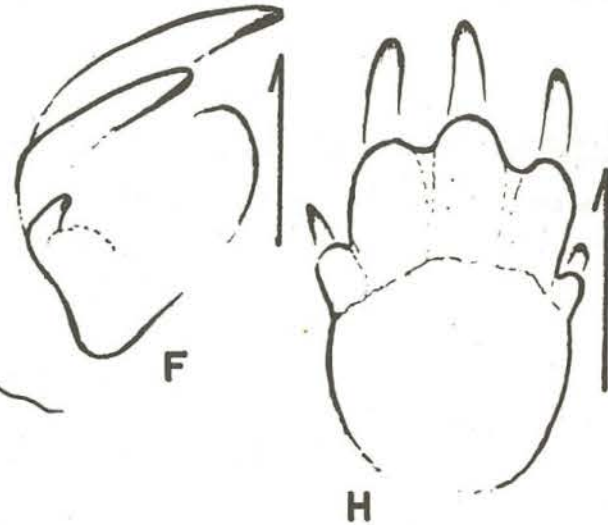
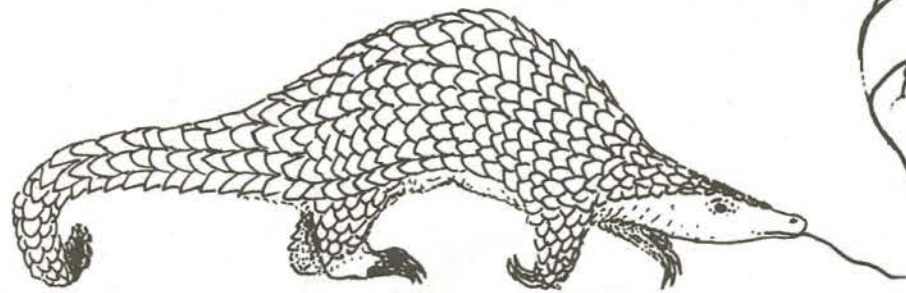


PHOLIDOTA - MANIDAE - Pangolins

The feet are sturdy with short fused digits and long and strong nails. The nails on the forefeet are very long and are turned inward while walking, so that only the back of the hand touches the ground.

Manis javanica - Malay pangolin - tenggiling

Mainly arboreal. SU, BO, JA, BA, many smaller islands  
Forested areas.



RODENTIA - Rodents

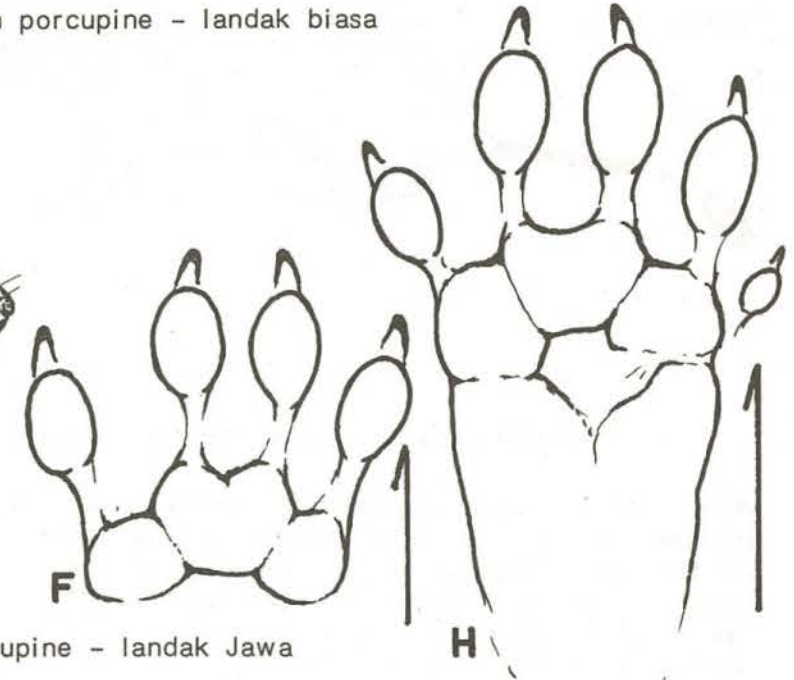
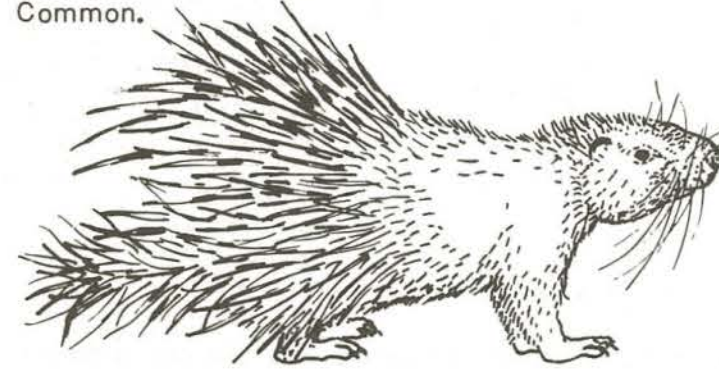
Most of the numerous species of rodents - rats, mice, squirrels - are small to very small and do not make identifiable tracks. All rodents have simple feet with four digits on the fore- and five on the hindfeet.

HYSTRICIDAE - Porcupines

The largest rodents in the area. The digits are large and the fairly strong nails are clearly visible in the prints. The sole is broad, composed of three or more distinct pads.

Hystrix brachyura - Southeast Asian porcupine - landak biasa

Terrestrial. SU, BO.  
Forest, open country, plantations.  
Common.

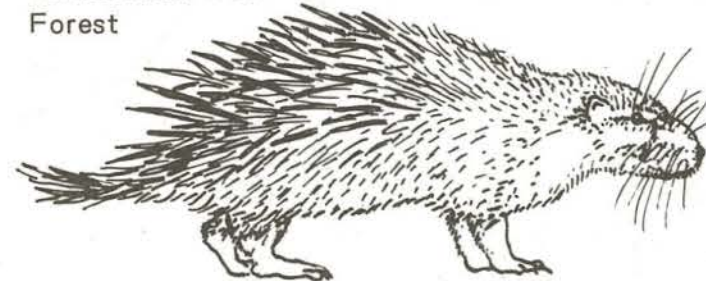


Hystrix javanica - Sunda island porcupine - landak Jawa

Terrestrial. JA, BA, Sulawesi, Flores.  
Forest, open country, plantations.  
Similar to Hystrix brachyura, but the quills are shorter, thinner and darker, with broad black rings and many with a black tip. The prints are similar.

Hystrix crassipinnis - Bornean thick-spined porcupine - landak Borneo

Terrestrial. BO.  
Forest



The prints are similar to those of Hystrix brachyura.



***Hystrix sumatrae*** - Sumatran thick-spined porcupine - landak Sumatra

Terrestrial. SU.

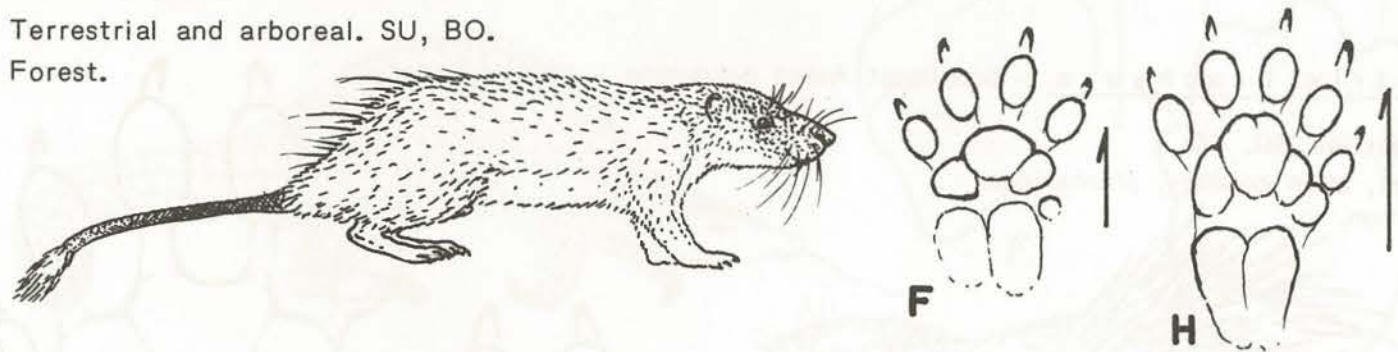
Forest.

Similar to *Hystrix crassipinnis*, but the quills are shorter and thinner and have a longer white tip. The tracks are similar.

***Trichys fasciculata*** - long-tailed porcupine - landak ekor panjang

Terrestrial and arboreal. SU, BO.

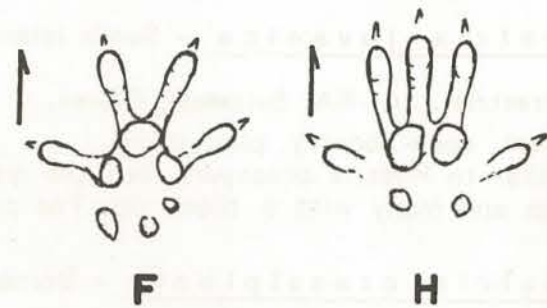
Forest.



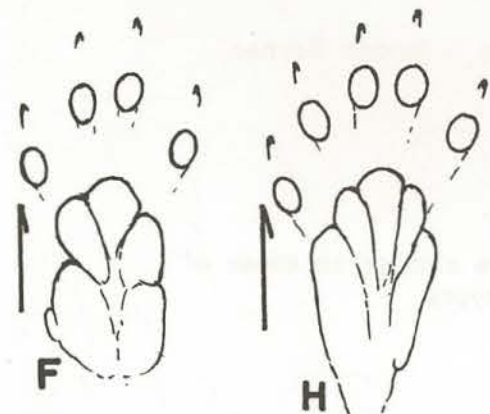
**MURIDAE and SCIURIDAE - Rats and Squirrels**

Many rats and squirrels are among the most common mammals. Squirrels are mainly arboreal and their tracks are rarely found, but rat tracks are often seen wherever there is some soft and fine mud. Because of the smallness of the prints and the great number of species, identification of individual tracks is impossible.

The forefoot has four digits and leaves a star-like print. The hindfoot has five digits of which the middle three are pointing forward. On the sole there are six well separated pads. The feet of squirrels are similar, but the outer digits point more forward and the sole pads are larger and more closely aligned.



Prints of a medium size rat.



Prints of a giant squirrel (*Ratufa affinis*)



Prints of a medium-sized ground squirrel (*Lariscus insignis*)

**CARNIVORA - Meat-eating Mammals**

The feet of the carnivores have thick cushions or pads on the underside, that are usually well separated. At the end of each digit there is a round or oval digital or toe pad. Under the finger-joints there is the plantar or sole pad, with three or more lobes, and at the heel there is the heel pad, which in most species is only used at rest. The mode of walking varies from plantigrade (bears) to extreme digitigrade (cats). The first digit is often reduced or absent, or placed so high that it does not touch the ground. The other digits are generally about of equal size. The carnivores have long sharp claws, that are normally (with the exception of the cats and a few others) visible in the print. The claws of the cats are retractile and never show in the print.

**CANIDAE - Dog family**

The sole pad is small and three-lobed. There are four toes with relatively large toe pads and broad blunt nails.

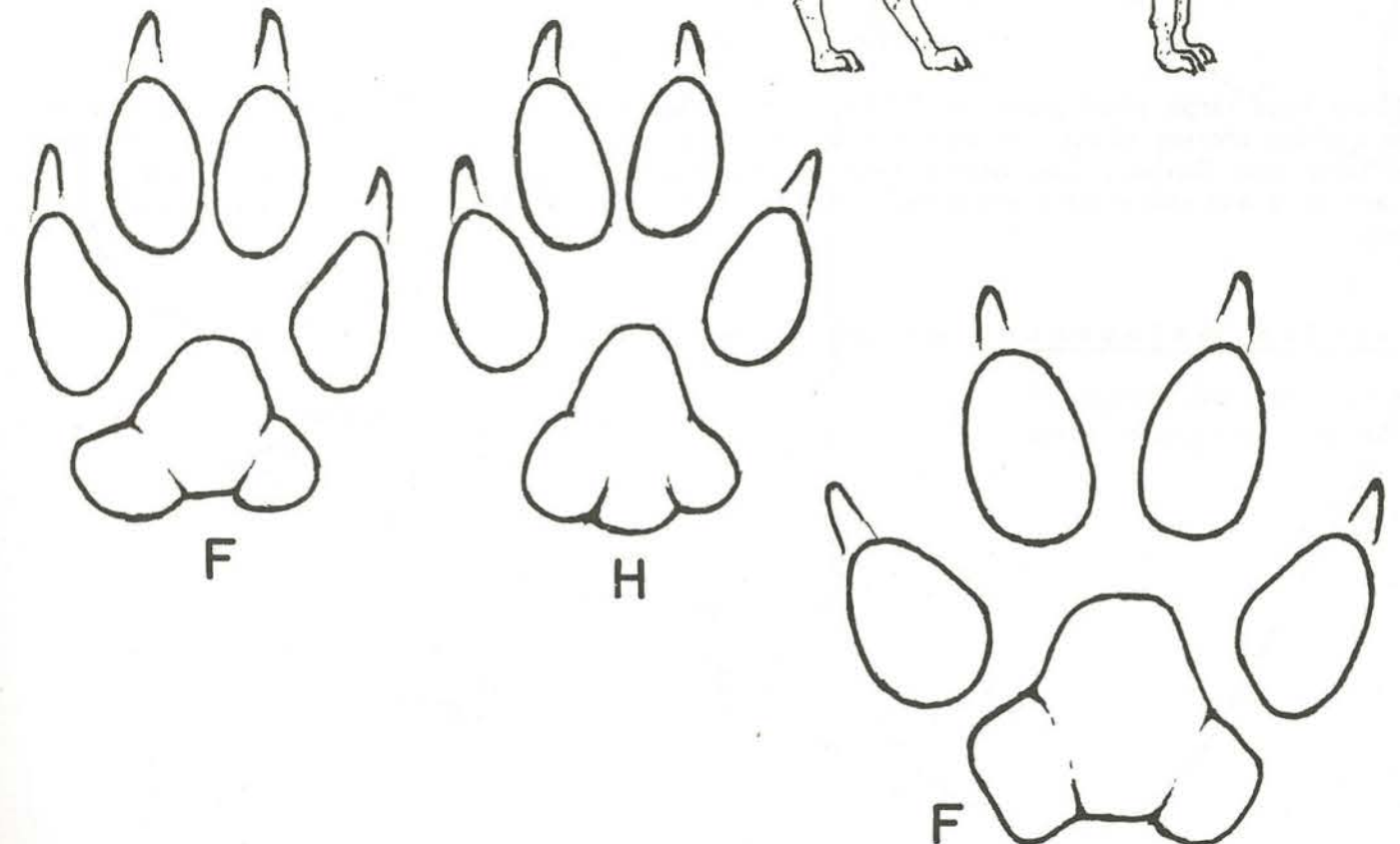
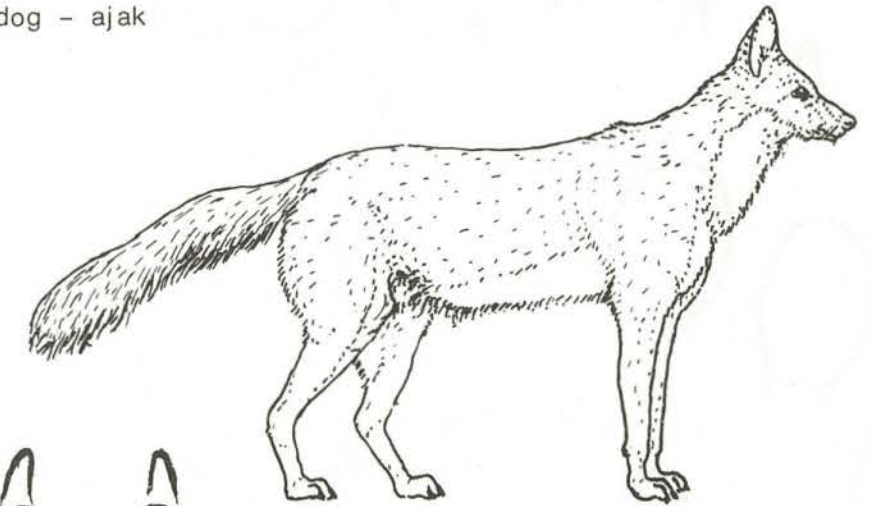
***Cuon alpinus*** - Asian wild dog - ajak

Terrestrial. SU, JA.

Forest and open country.

In Sumatra locally still common, in Java very rare now.

Often in small groups.



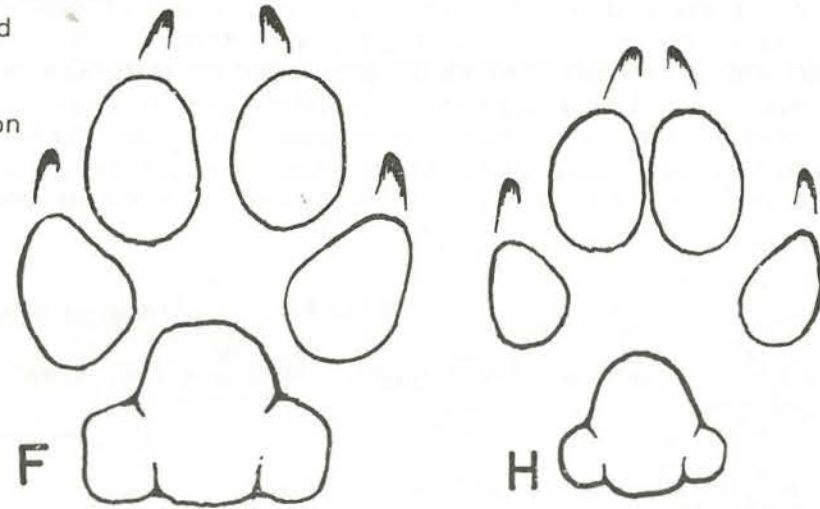
large splayed print



Canis familiaris - domestic dog - anjing

Terrestrial. Common where man has settled.  
Semi-feral dogs are abundant around habitation.

The prints of dogs and ajaks are almost indistinguishable. The common type of dog in rural Indonesia is slightly smaller than the ajak and the side lobes of the sole pad appear to be slightly differently shaped.

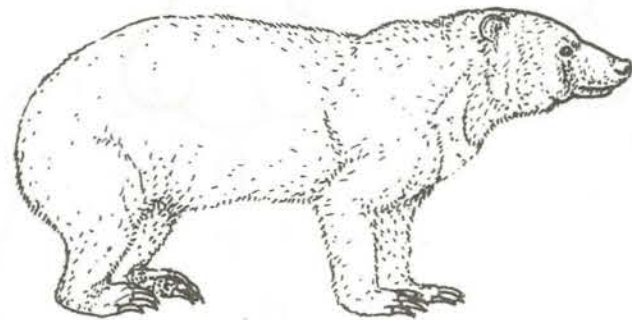


URSIDAE - Bear family

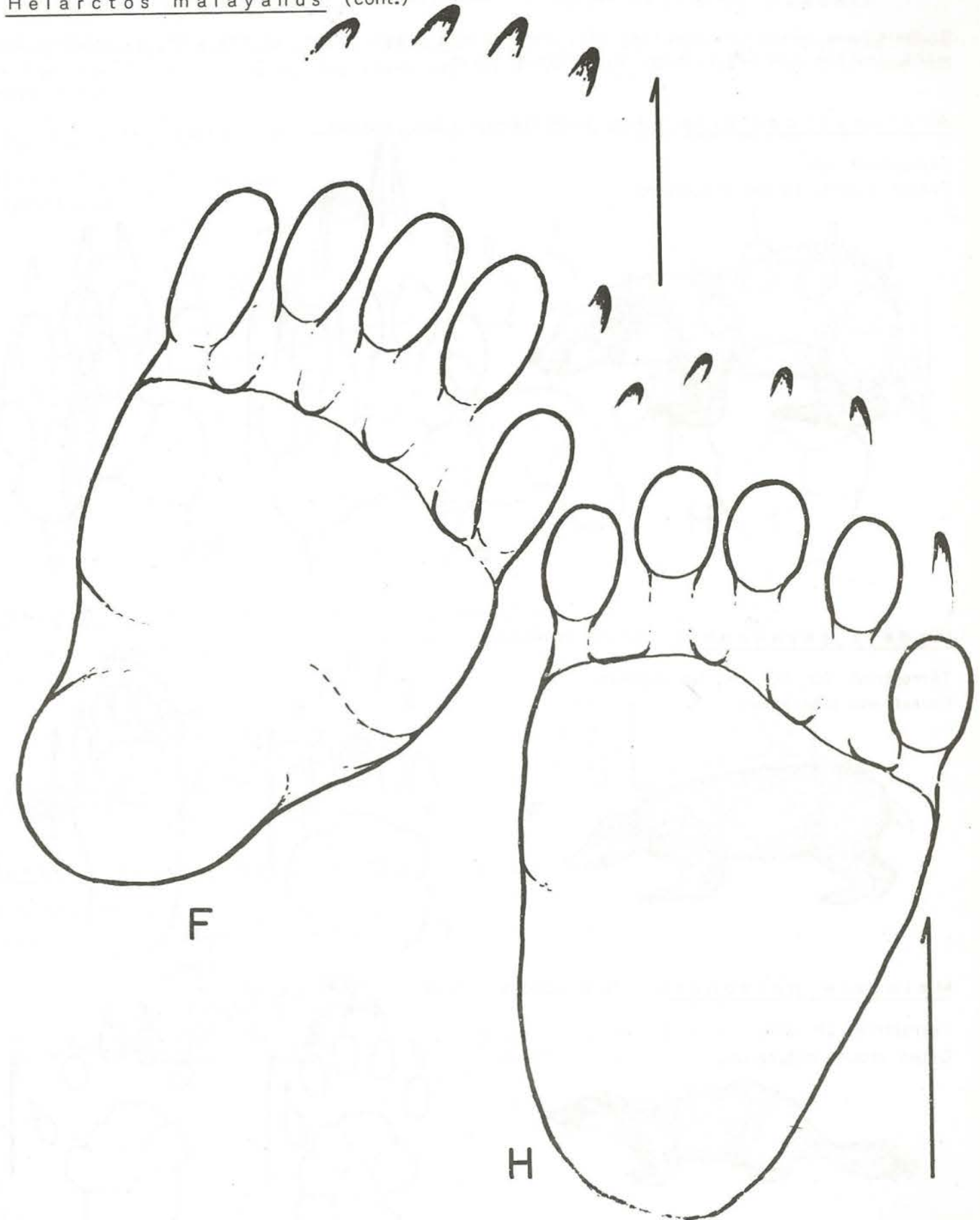
The bears have large plantigrade feet, that superficially resemble the human foot. This has lead to the famous stories about unknown human-like creatures (orang pendek) living in remote parts of Sumatra and Borneo. The bear's feet are normally markedly turned with the toes inward. The very long and sharp nails are often not visible in the print, because they are held high while walking.

Helarctos malayanus - sun bear - beruang madu

Terrestrial. SU, BO, Bangka ?  
Still common in forested areas.



Helarctos malayanus (cont.)



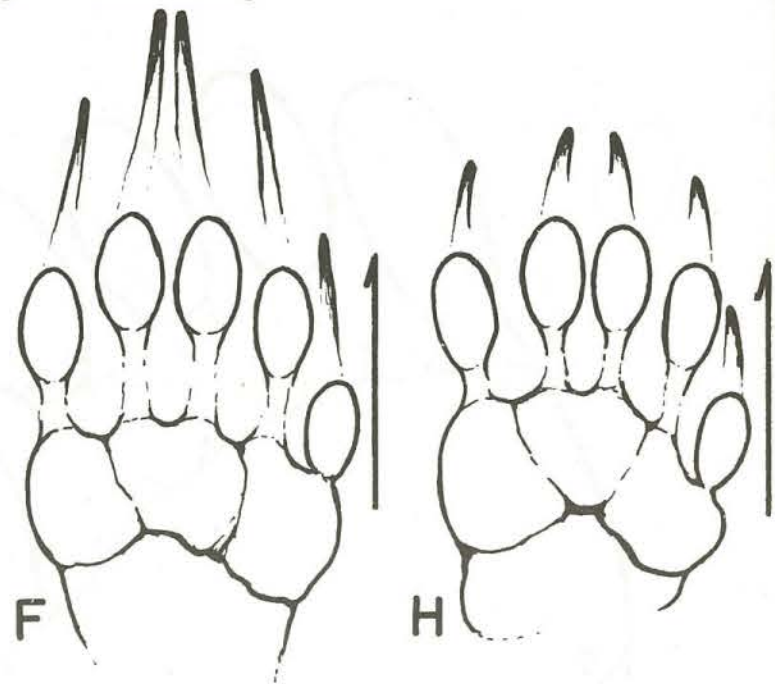
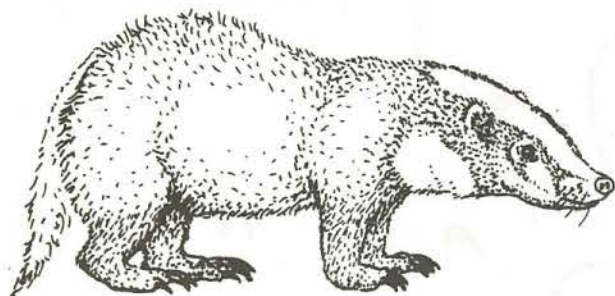


MUSTELIDAE - MELINAE - Badgers

Badgers have relatively large feet with long straight claws. There are five toes, all pointing forward, and the sole pad is broad with several lobes.

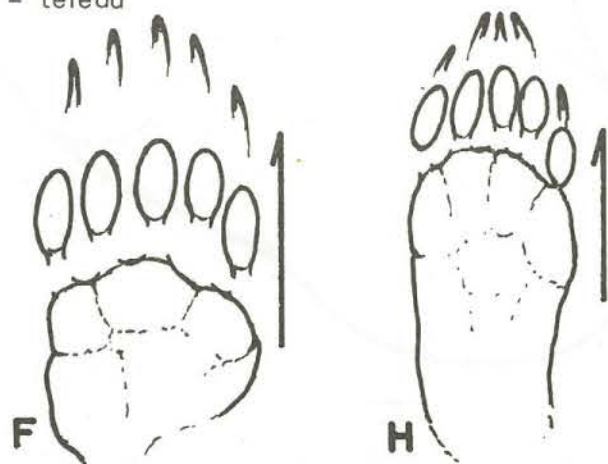
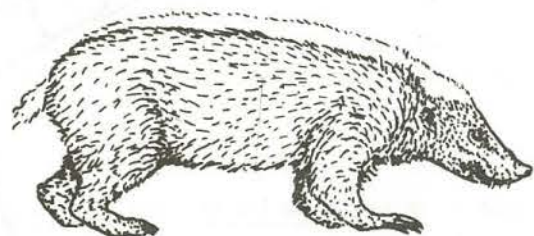
Arctonyx collaris - Hog-nosed badger - babi batang

Terrestrial. SU  
Forest, mainly in the mountains



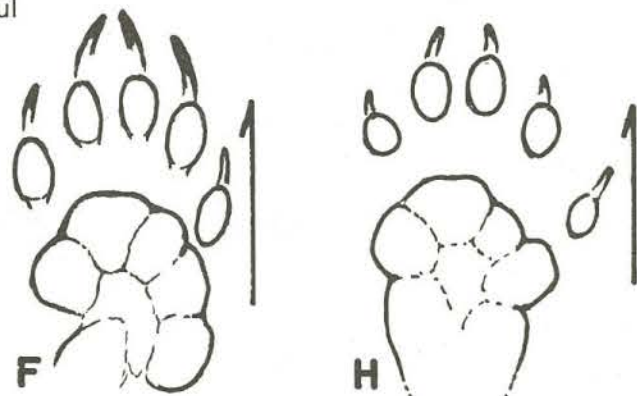
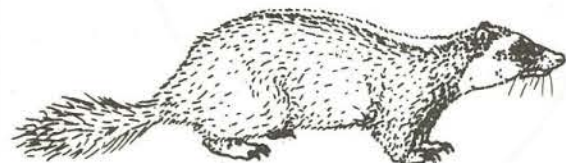
Mydaus javanensis - Malay stinkbadger - teledu

Terrestrial. SU, BO, JA, Natunabesar  
Forest and plantations



Melogale personata - ferret-badger - biul

Terrestrial. JA, BO.  
Often around habitation.

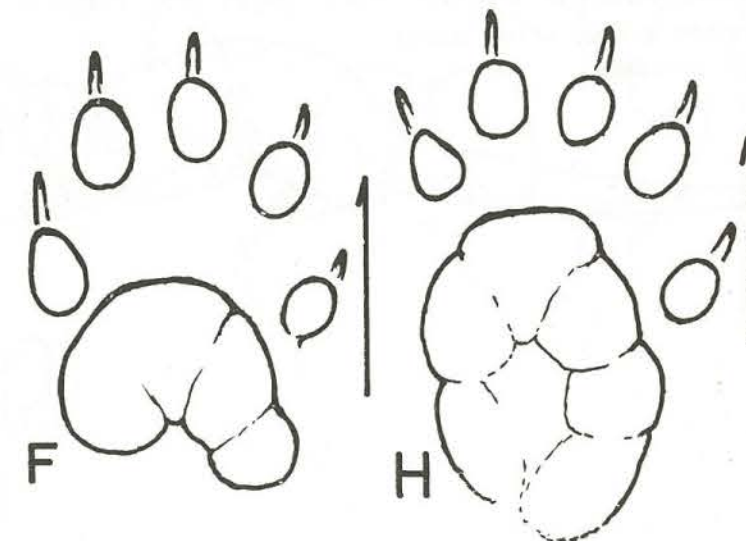
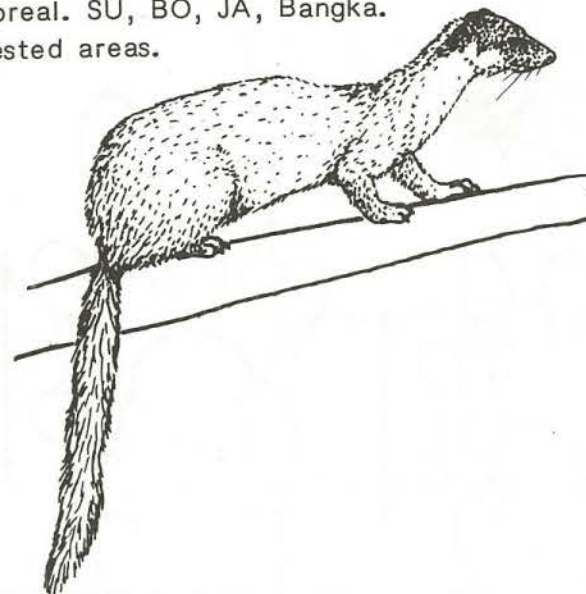


MUSTELIDAE - MUSTELINAE - Martens and weasels

Martens and weasels have unspecialised carnivore feet, much like those of the viverrids. There are five toes in a semi-circle. The claws are moderately long and sharp. The sole pad has distinct lobes.

Martes flavigula - yellow-throated marten - musang tenggorokan kuning

Arboreal. SU, BO, JA, Bangka.  
Forested areas.



Mustela nudipes - Malay weasel - musang pisang

Terrestrial. SU, BO, JA.  
Forest and open country.



Mustela lutreolina - Javan weasel - mermer

Terrestrial. SU(south), JA.  
Mountain forests, probably rare.



The prints are similar to those of *Mustela nudipes*.

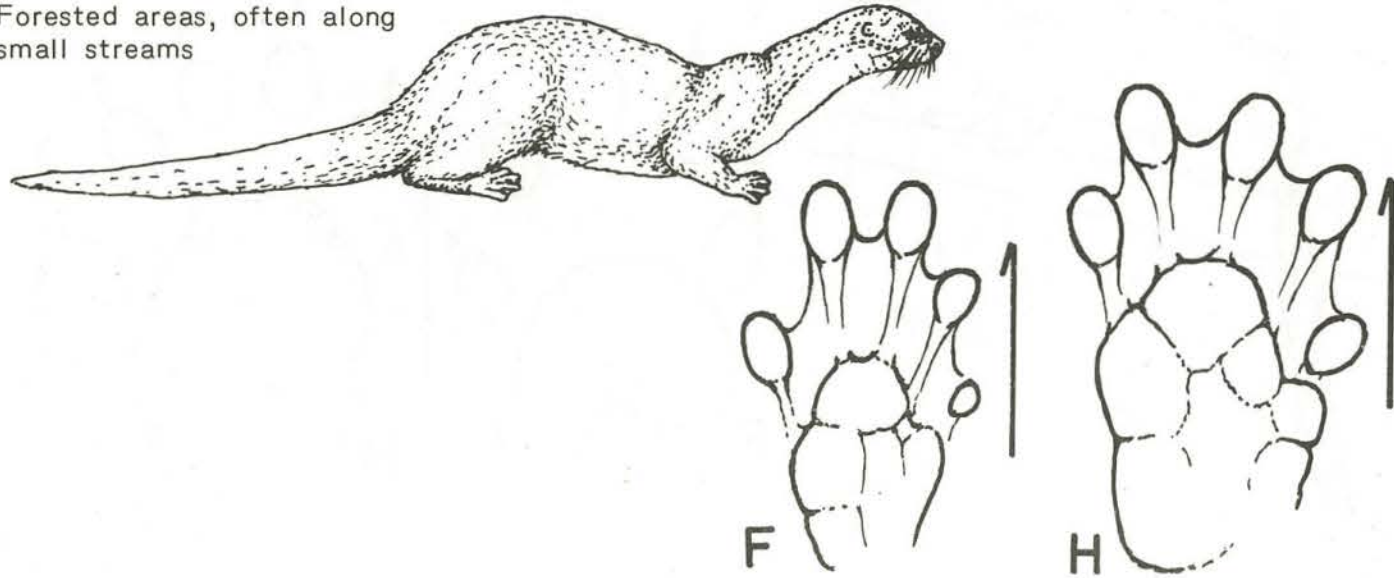


MUSTELIDAE - LUTRINAE - Otters

The otters are semi-aquatic mammals. Their feet are large with long toes that are connected by a web of skin. The nails are generally short or reduced. The web is often visible in the print. Otter tracks are sometimes found far from streams and rivers. The species are rather similar in form and colouration.

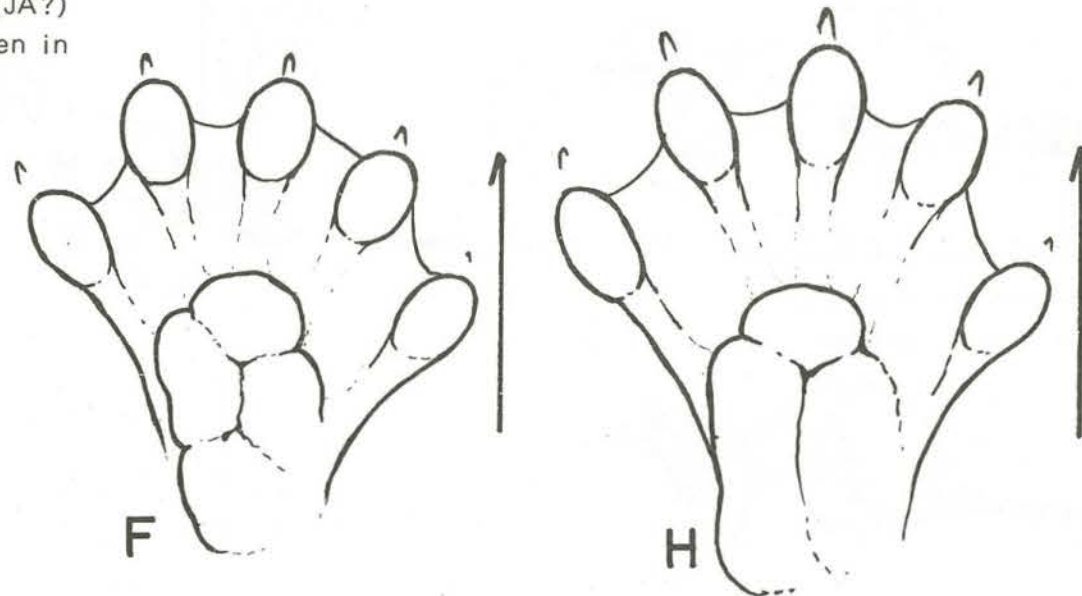
Aonyx cinerea - small-clawed otter - belang2 cakar kecil

Semi-aquatic. SU, BO, JA, Riau/Lingga isls., Karimunjawa.  
Forested areas, often along small streams



Lutra lutra - common otter - belang2 utara

Semi-aquatic. SU, (JA?)  
Forested areas, often in the mountains.

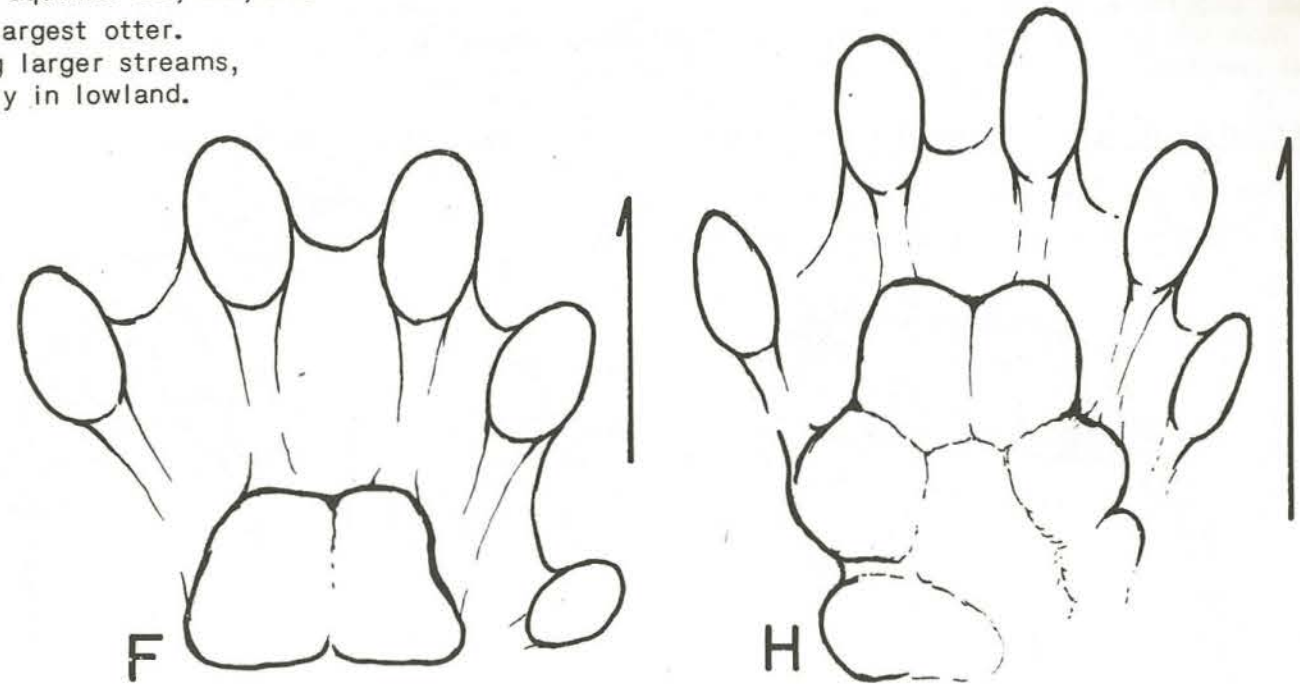


Lutra sumatrana - hairy-nosed otter - belang2 berkumis

Semi-aquatic. SU, BO.  
Along the larger rivers and the sea-coast.  
The tracks are probably indistinguishable from those of Lutra lutra.

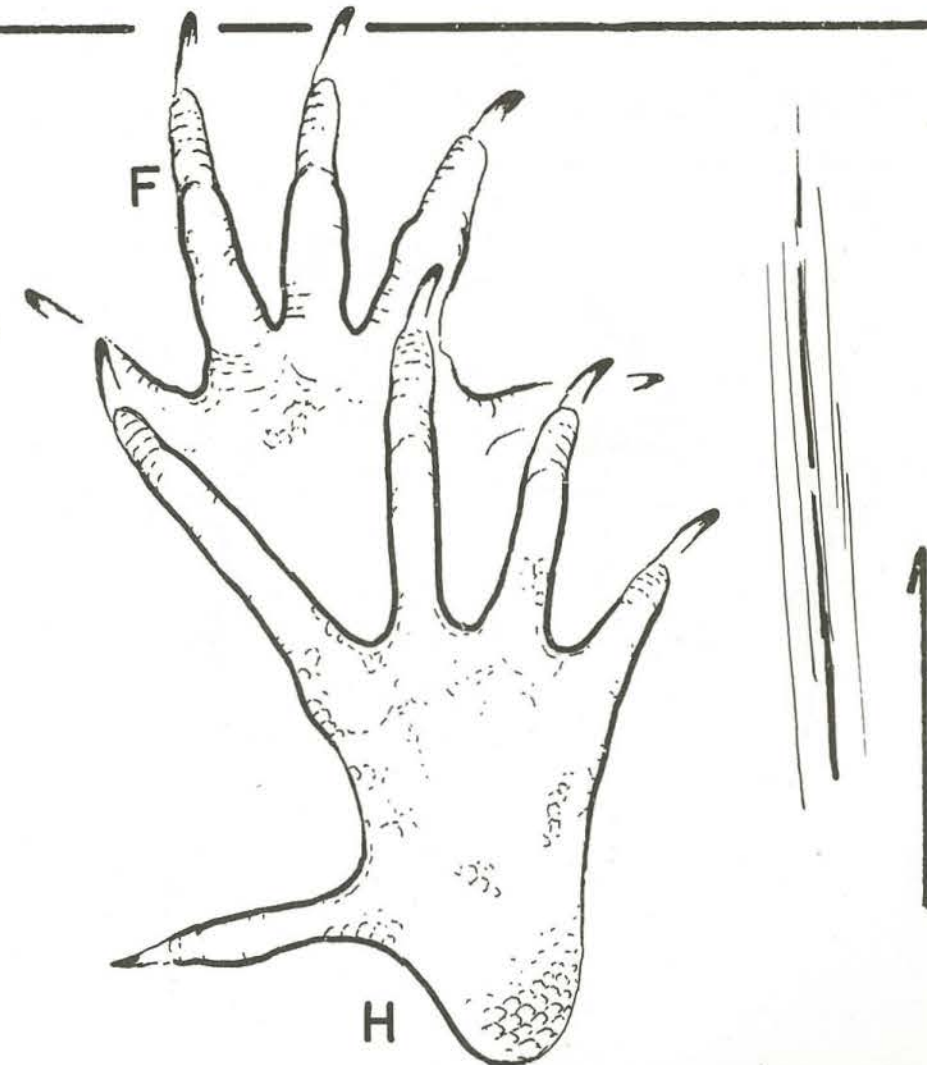
Lutra perspicillata - smooth otter - belang2 bulu licin

Semi-aquatic. SU, BO, JA.  
The largest otter.  
Along larger streams, mainly in lowland.



For comparison

Varanus salvator - monitor lizard  
Common along water.



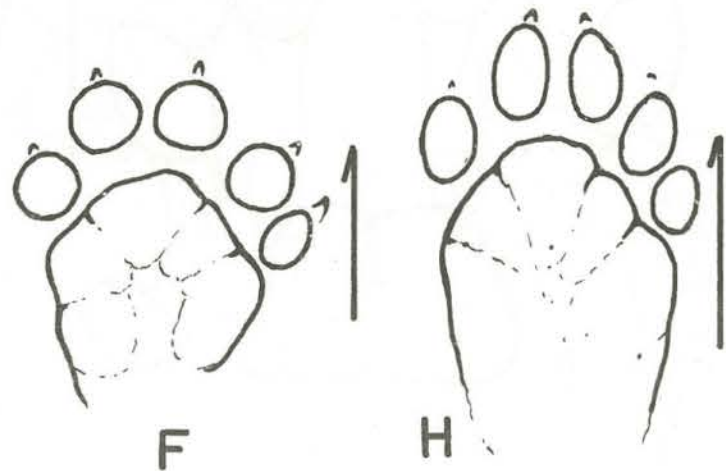
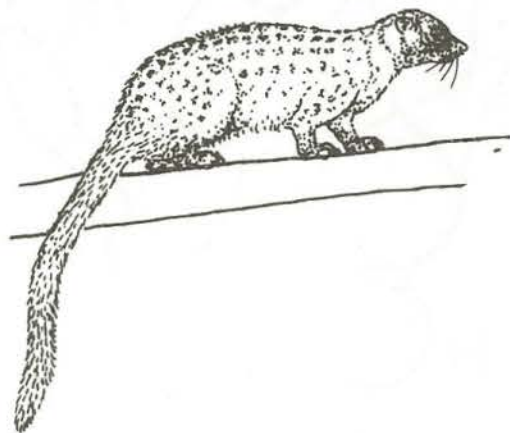


VIVERRIDAE - Civet cats

The civets usually have rather unspecialised carnivore feet. The sole pad is large with distinct lobes and there are five, sometimes four, toes arranged in a semi-circle. The claws are short to moderately long and sharp, and they are often visible in the print. All species climb very well and some are strictly arboreal, others are mainly terrestrial.

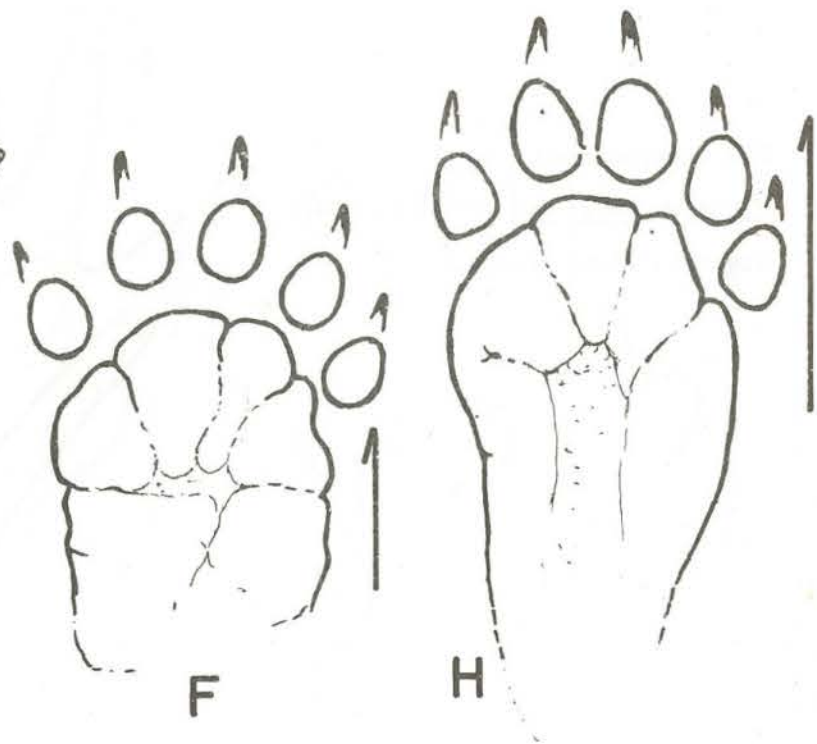
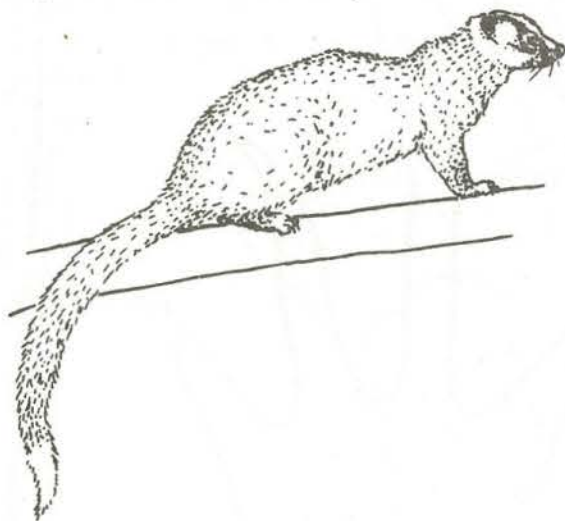
Paradoxurus hermaphroditus - common palm civet - luwak biasa

Terrestrial and arboreal. SU, BO, JA, BA, Sulawesi, most smaller islands.  
Very common in forests, plantations and settlements.



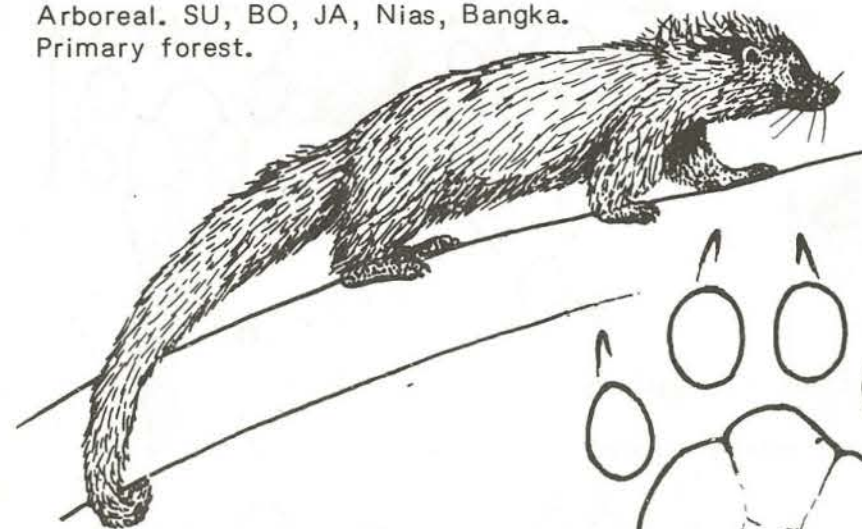
Paguma larvata - masked palm civet - musang merah

Terrestrial and arboreal. SU, BO.  
Forests, also near habitation.



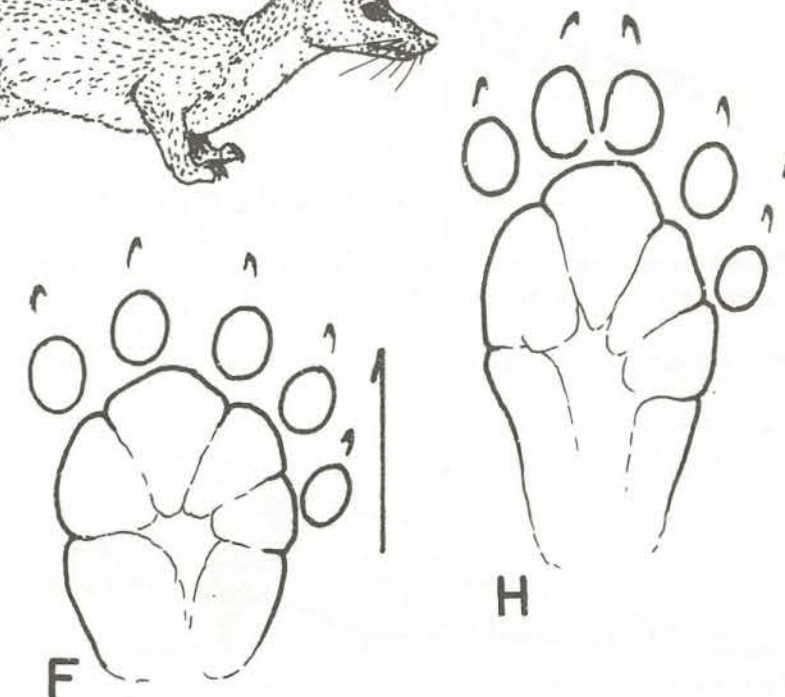
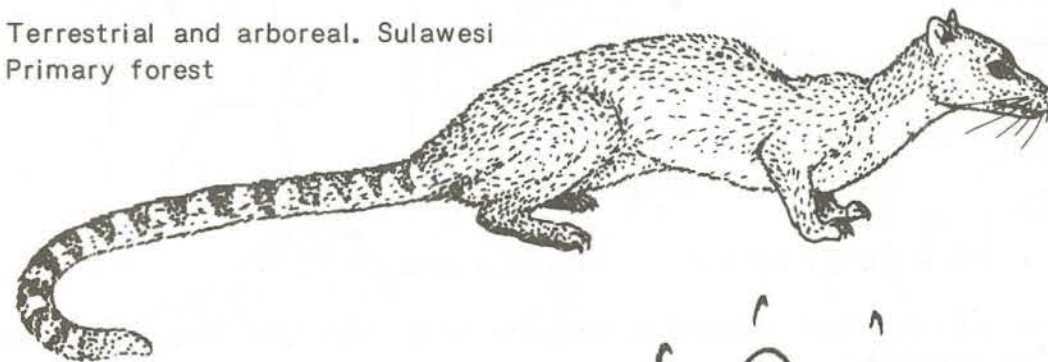
Arctictis binturong - binturong

Arboreal. SU, BO, JA, Nias, Bangka.  
Primary forest.



Macrogalidia musschenbroekii - Celebes palm civet - musang Sulawesi

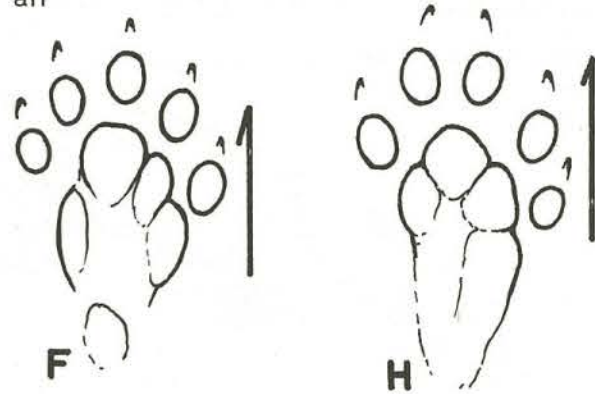
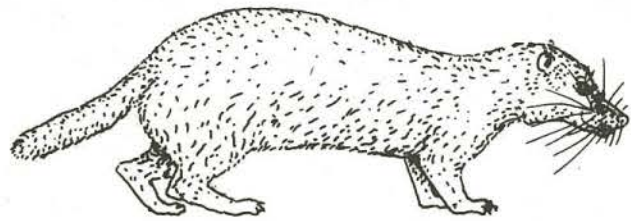
Terrestrial and arboreal. Sulawesi  
Primary forest





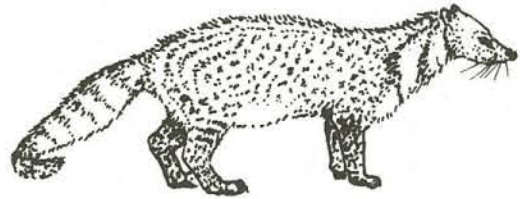
***Cynogale bennettii*** - otter civet - musang air

Semi-aquatic. SU, BO.  
Forested areas, probably rare.



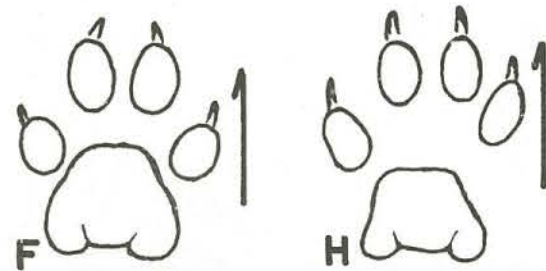
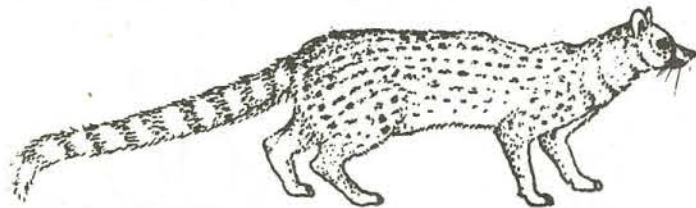
***Viverra tangalunga*** - Malay civet - tenggalong

Mainly terrestrial. SU, BO, Sulawesi, many smaller islands.  
Common, also around habitation.



***Viverricula indica*** - little civet - rase

Mainly terrestrial. SU, JA, BA, Kangean.  
Common, also around habitation.

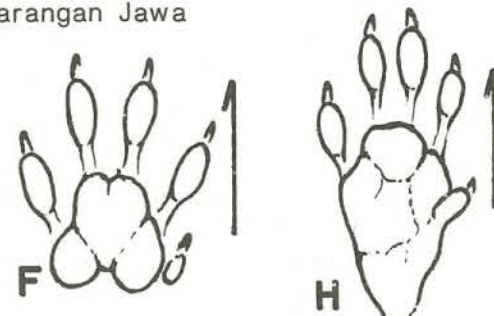


**HERPESTIDAE - Mongooses**

These small carnivores have the first digit reduced in size. The other digits are long and slender, more finger-like than in the viverrids.

***Herpestes javanicus*** - Javan mongoose - garangan Jawa

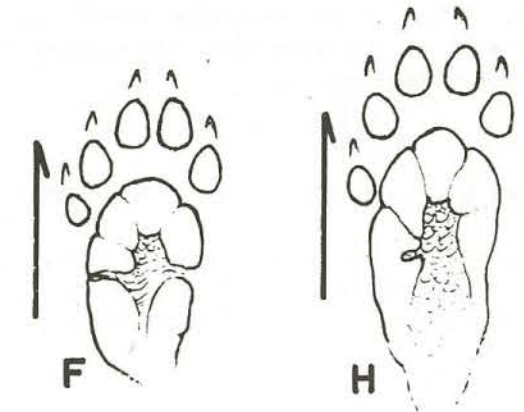
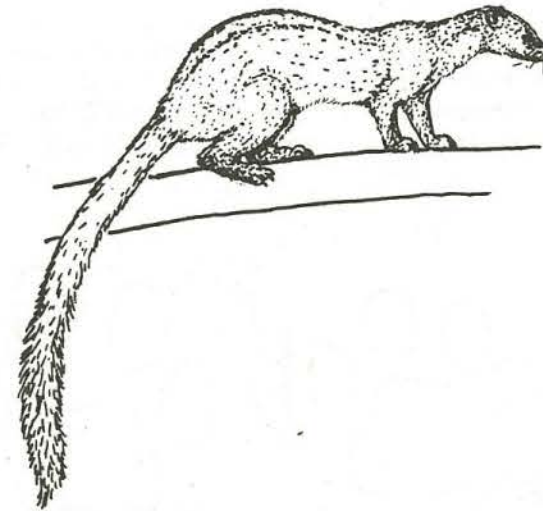
Terrestrial. SU, JA.  
Common, often near habitation.



Two or three other species occur in the Greater Sundas. They are similar in size and form and their footprints are probably inseparable.

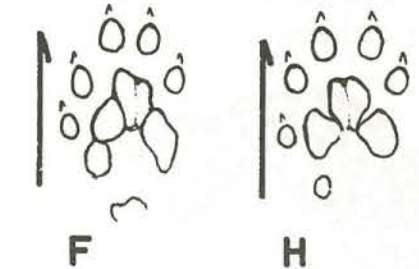
***Arctogalidia trivirgata*** - three-striped palm civet - musang akar

Arboreal. SU, BO, JA, most smaller islands  
Forested areas.



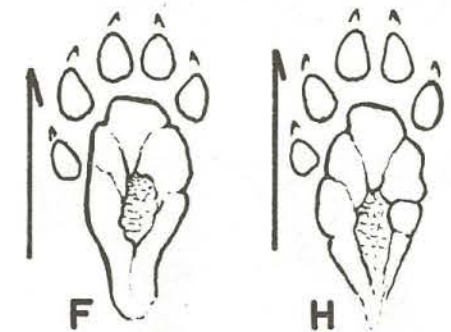
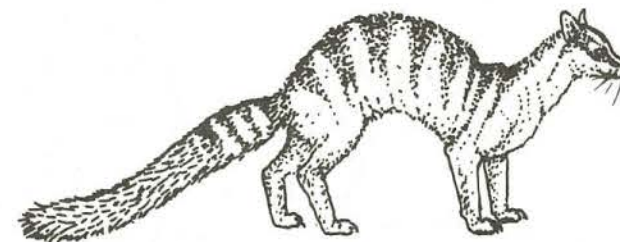
***Prionodon linsang*** - banded linsang - linsang

Arboreal. SU, BO, JA, Bangka, Belitung  
Forested areas, probably rare.



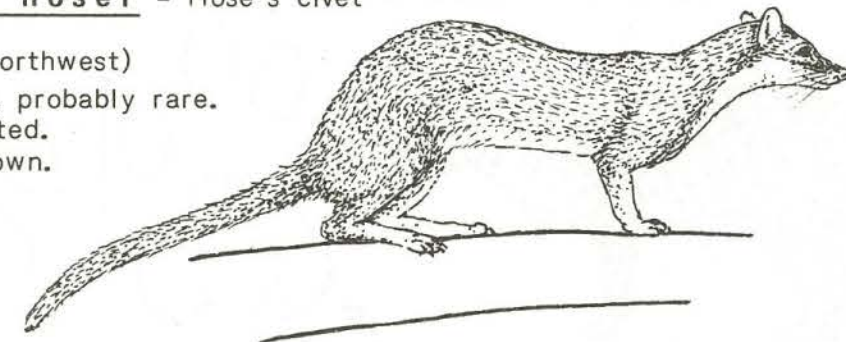
***Hemigalus derbyanus*** - banded palm civet - musang belang

Arboreal. SU, BO, Mentawai isls.



***Hemigalus hosei*** - Hose's civet

Arboreal. BO (northwest)  
Mountain forest, probably rare.  
Only few collected.  
Footprints unknown.



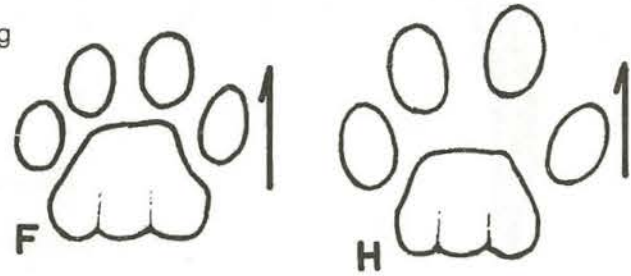


FELIDAE - Cat family

The footprints of all cats, from small to large, differ mainly in size. In form they are all very similar. The claws are never visible in the print and the forefeet are broader and shorter than the hindfeet. Apart from the size there are small differences in the proportions of the pads and in the shape of the sole pad. The presence of a notch in the front of the sole pad is characteristic for some species.

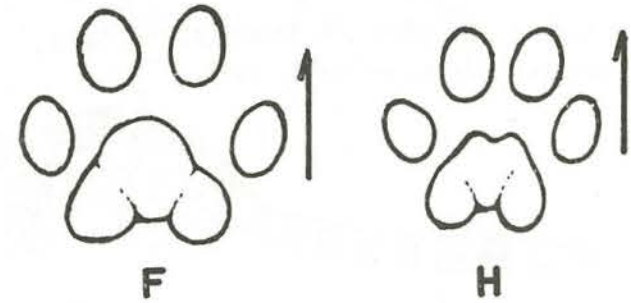
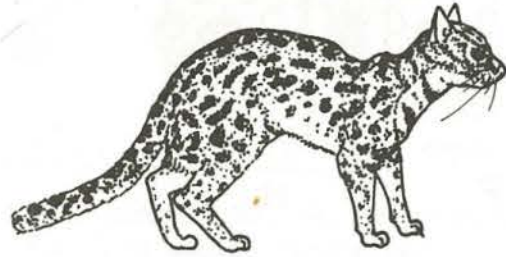
Felis catus - domestic cat - kucing kampung

Terrestrial. Common wherever man has settled, but usually not found very far from habitation. True feral populations are not known from west Indonesia.



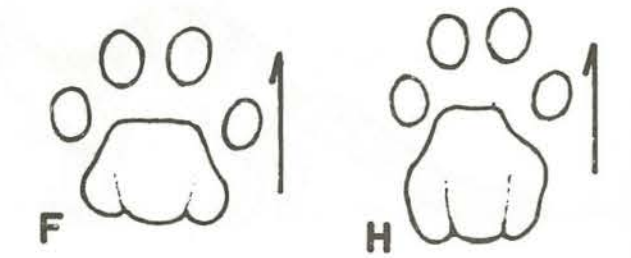
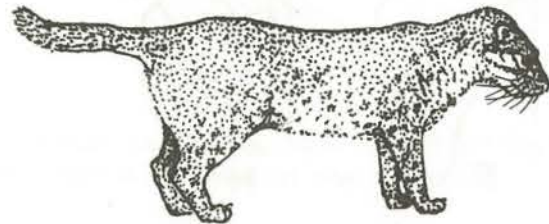
Felis bengalensis - leopard cat - kucing batu

Terrestrial. SU, BO, JA, BA, Nias. Common, even in densely populated areas.



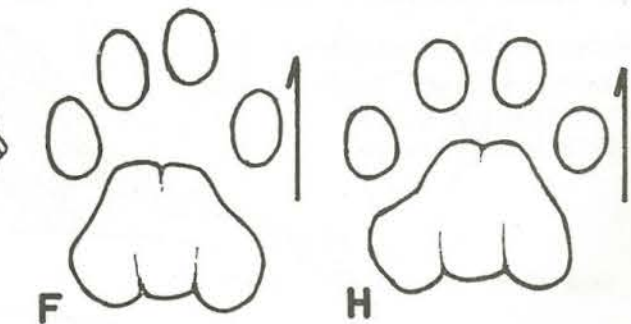
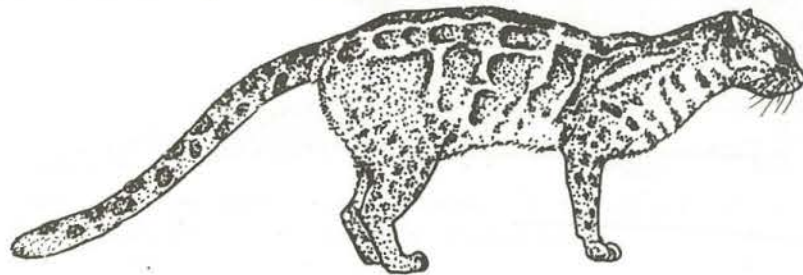
Felis planiceps - flatheaded cat

Terrestrial. SU, BO. Lowlands, probably rare.



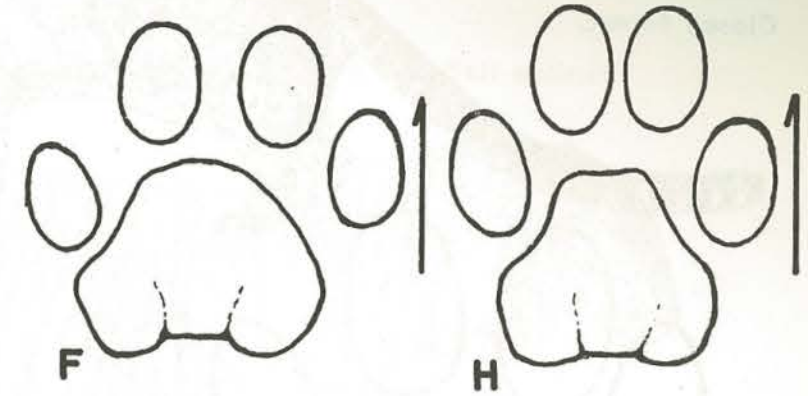
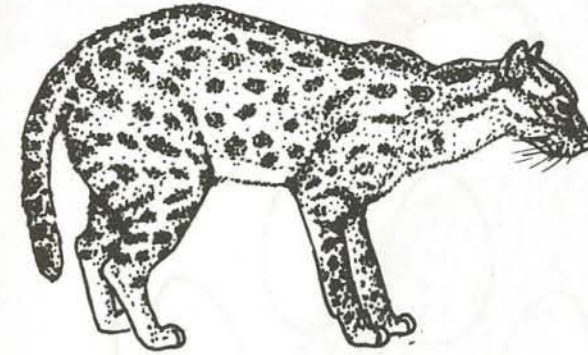
Felis marmorata - marbled cat - kucing bulu

Arboreal. SU, BO. Closed forest.



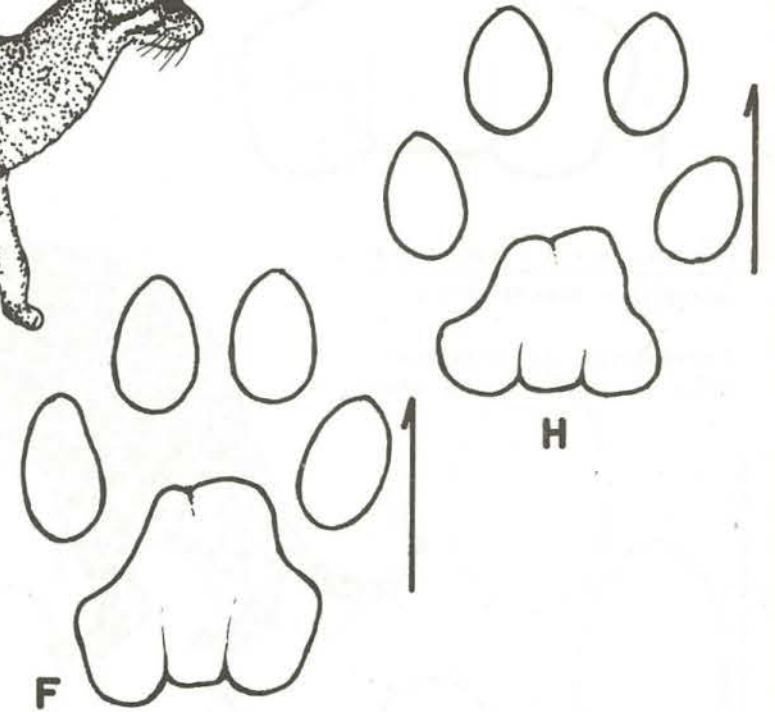
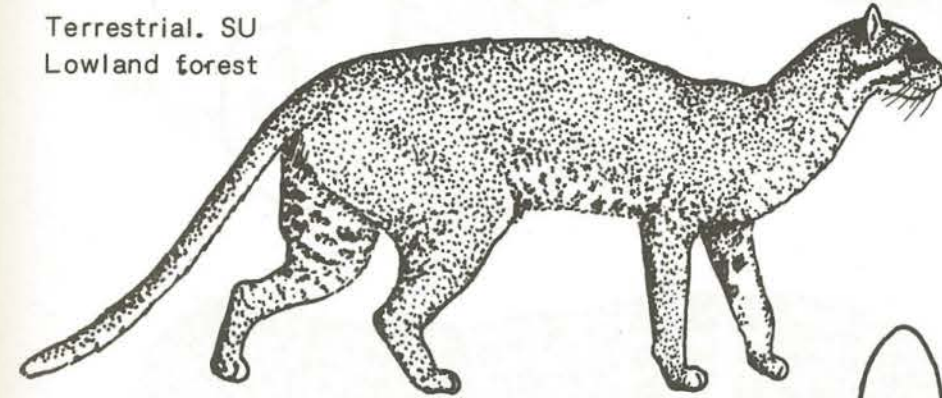
Felis viverrina - fishing cat - kucing bakau

Terrestrial. JA, (SU ?). Riverine and coastal forest.



Felis temminckii - golden cat - kucing emas

Terrestrial. SU. Lowland forest



Felis badia - bay cat

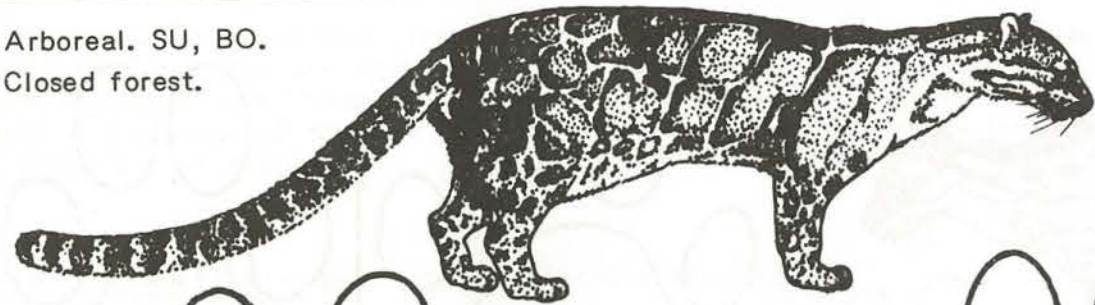
Terrestrial. BO. Probably rare. Colouration much like F. temminckii, but much smaller.





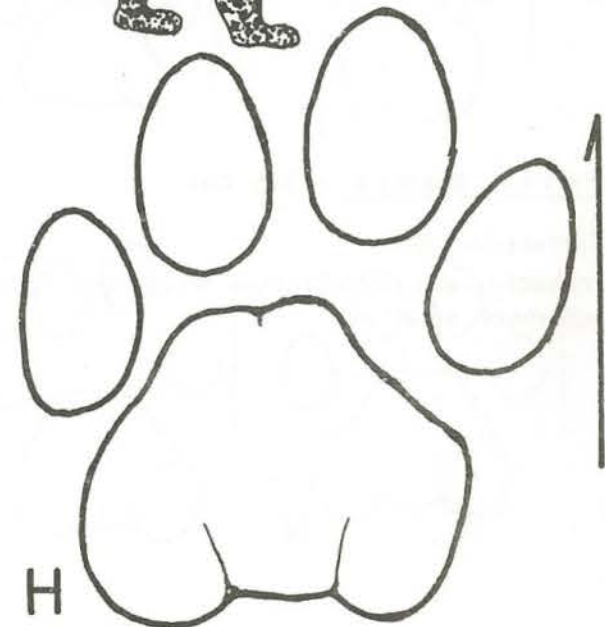
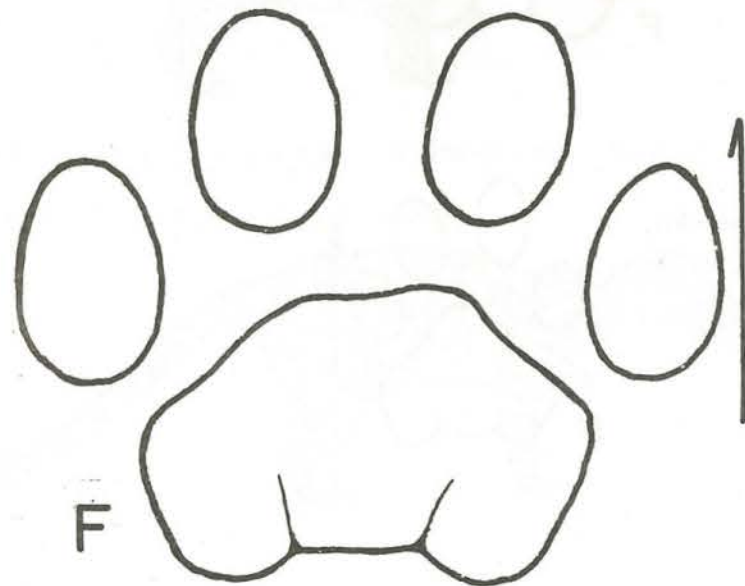
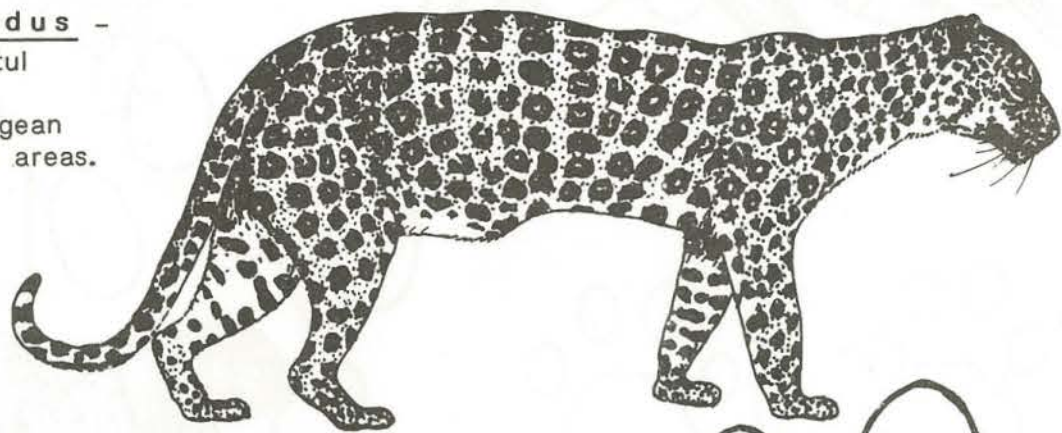
Neofelis nebulosa - clouded leopard - macan dahan

Arboreal. SU, BO.  
Closed forest.



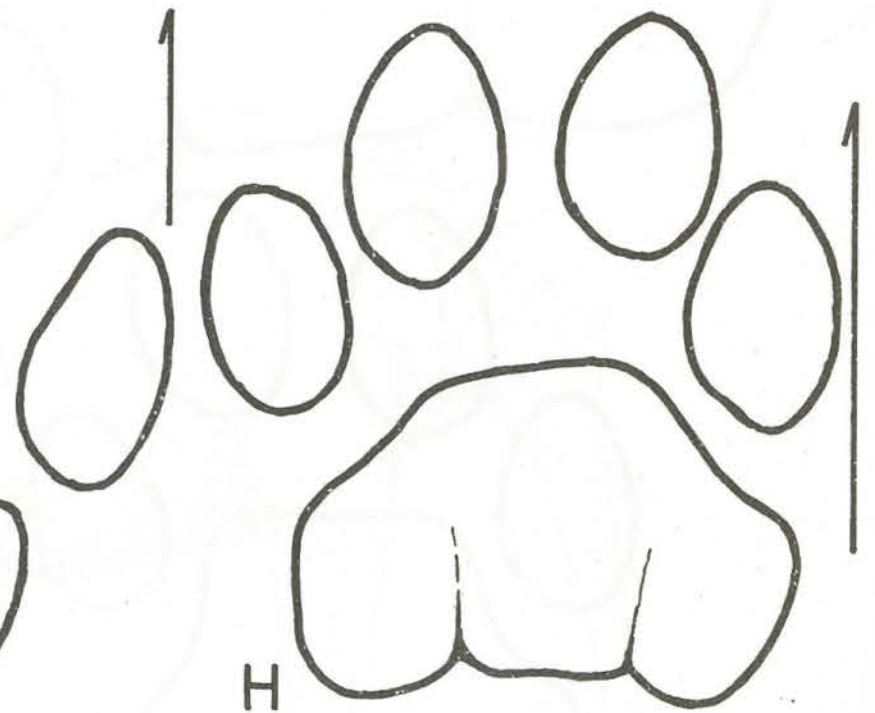
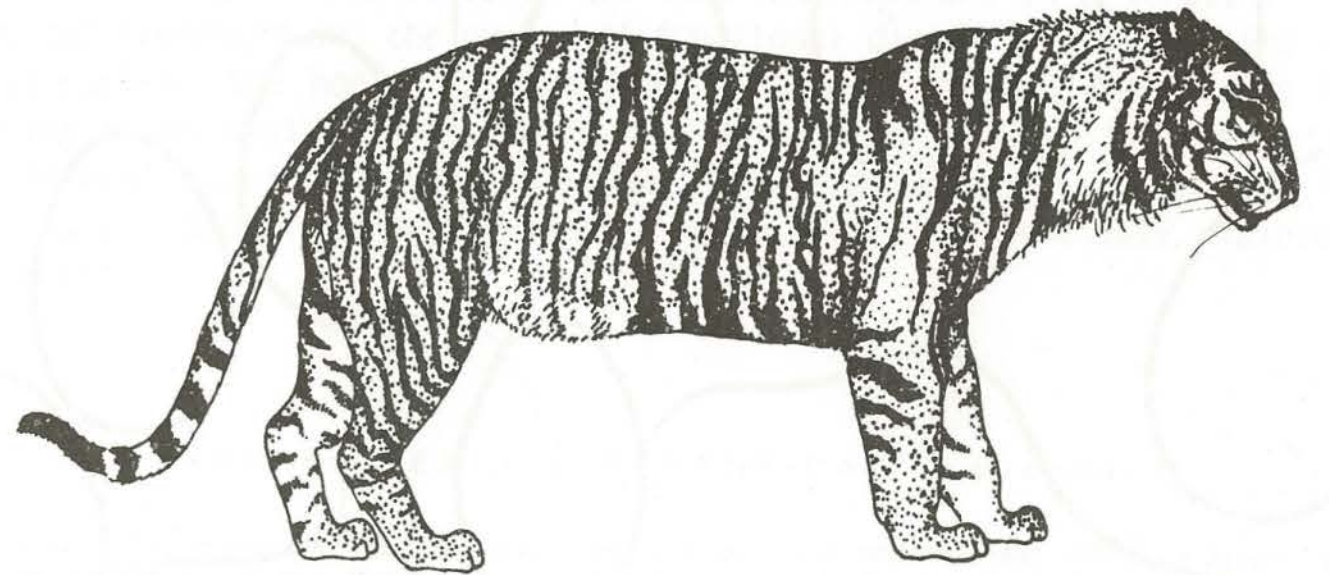
Panthera pardus - leopard - macan tutul

Terrestrial. JA, Kangean  
Now rare in remote areas.



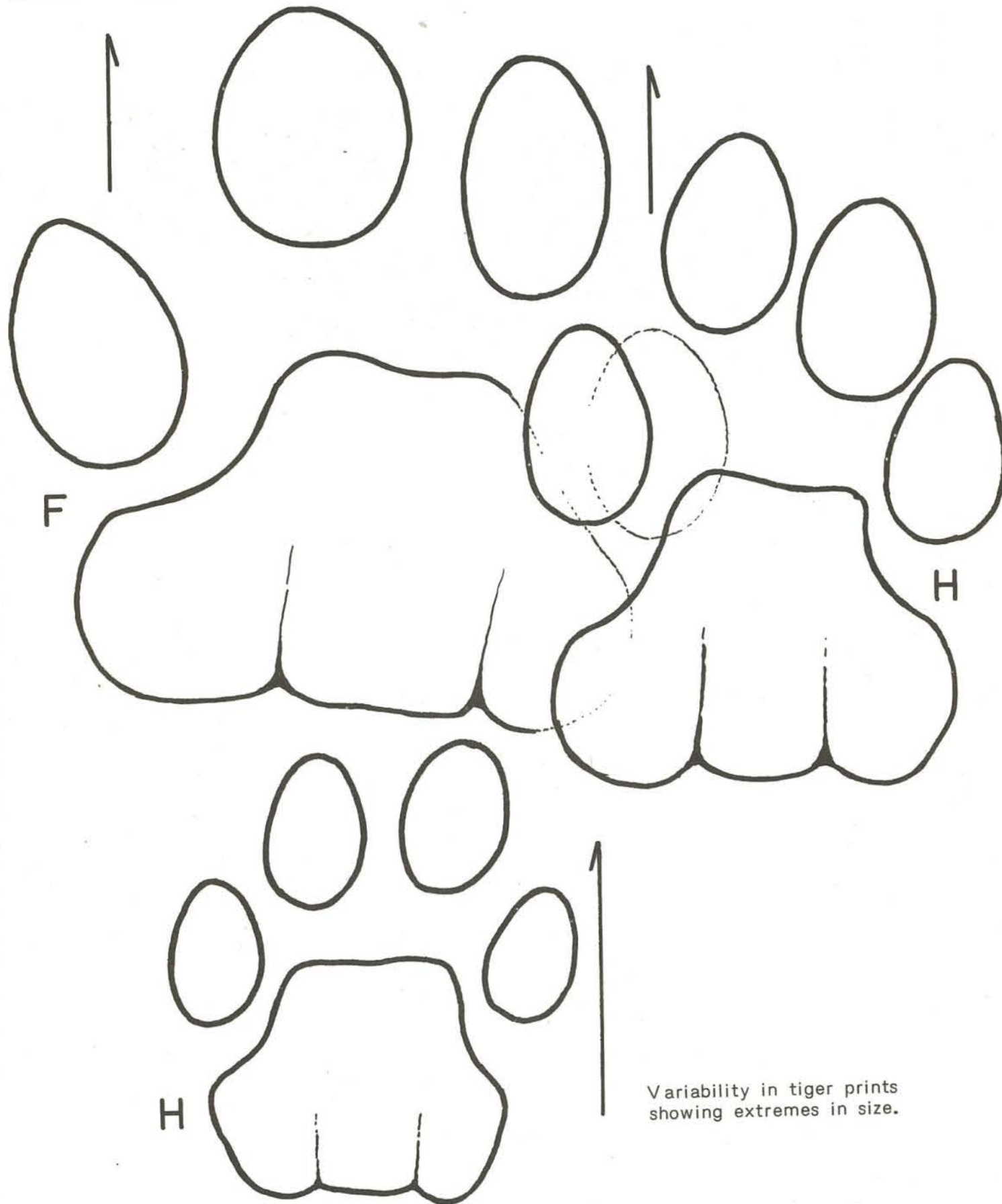
Panthera tigris - tiger - harimau loreng

Terrestrial. SU, JA(†), Bali (†).  
In forested and open country.  
In Sumatra still fairly common outside the population centres. In Java and Bali extinct.





Panthera tigris (cont.)



**UNGULATA - Hoofed Mammals**

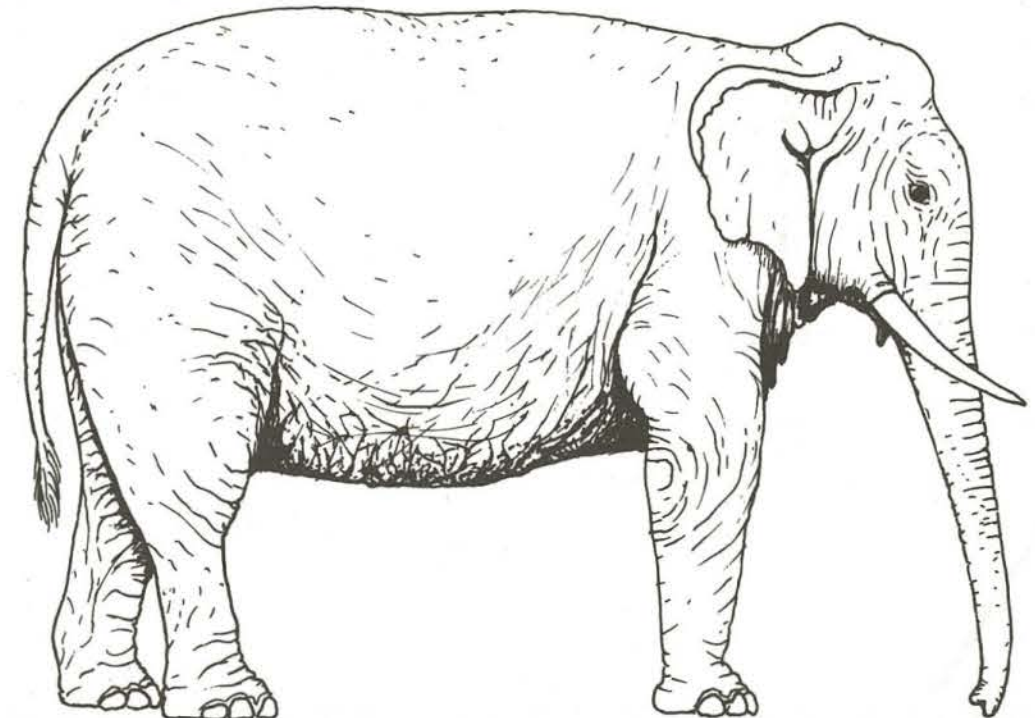
In the ungulate families the tips of the digits provide the main walking surface - unguligrade foot - and they are encased in a strong horn sheath, the hoof or ungula. The bones in the hand and foot are in a vertical position and elongated and the number of functional digits is reduced. The vertical part of the hoof - the wall - is composed of hard and strong horn and encircles most of the end of the digit. The horizontal undersurface of the hoof inside the wall is softer. The front part is horny, the hind part is a fibrous cushion, the ball. These parts are generally visible in the print.

**PROBOSCIDEA - ELEPHANTIDAE - Elephants**

The largest land mammals. The legs are robust and columnar and the feet end in a large fibrous cushion, with four or five flat hoofs around the front half. The forefoot is nearly circular, the hindfoot is oval. The prints of fore and hindfeet do not overlap but are about equally spaced along the track.

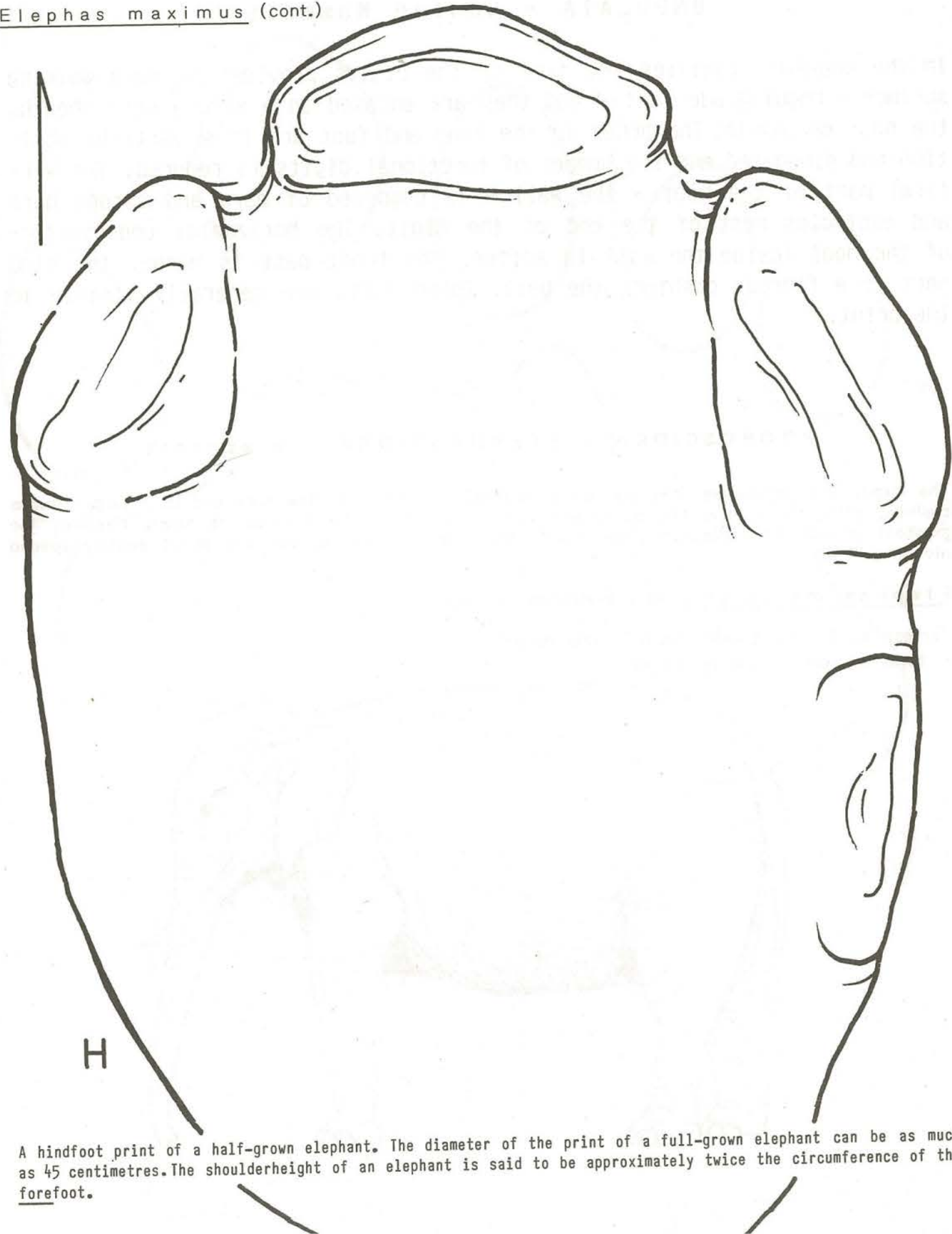
Elephas maximus - Asiatic elephant - gajah

Terrestrial. SU, BO (northwest only, introduced)  
In forested areas, often in groups.





Elephas maximus (cont.)



A hindfoot print of a half-grown elephant. The diameter of the print of a full-grown elephant can be as much as 45 centimetres. The shoulderheight of an elephant is said to be approximately twice the circumference of the forefoot.

PERISSODACTYLA - Odd-toed ungulates

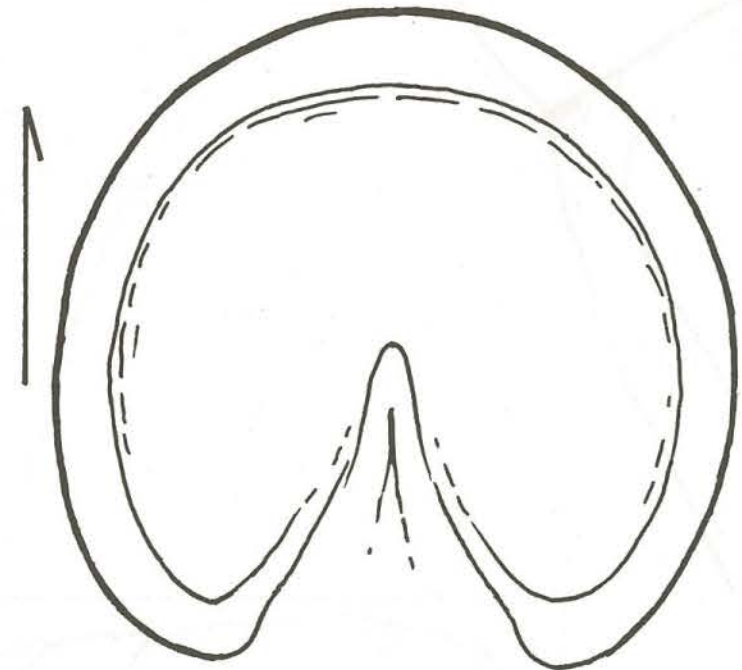
In the odd-toed ungulates the axis of the foot is in the 3rd digit. This digit is the largest and the others are smaller or absent. In total there are one or three - rarely four - hoofs on each foot.

EQUIDAE - Horses

Only the 3rd digit is functional with a single round hoof.

Equus caballus - domestic horse - kuda

Terrestrial. A small breed is locally kept, mainly in mountain areas. True feral populations are not known from west Indonesia.



RHINOCEROTIDAE - Rhinoceroses

There are three functional digits. The foot is composed of a roundish fibrous cushion, with three large hoofs. The central hoof in the front of the foot is semi-circular. The two other hoofs on the side of the foot are slightly smaller and more triangular.

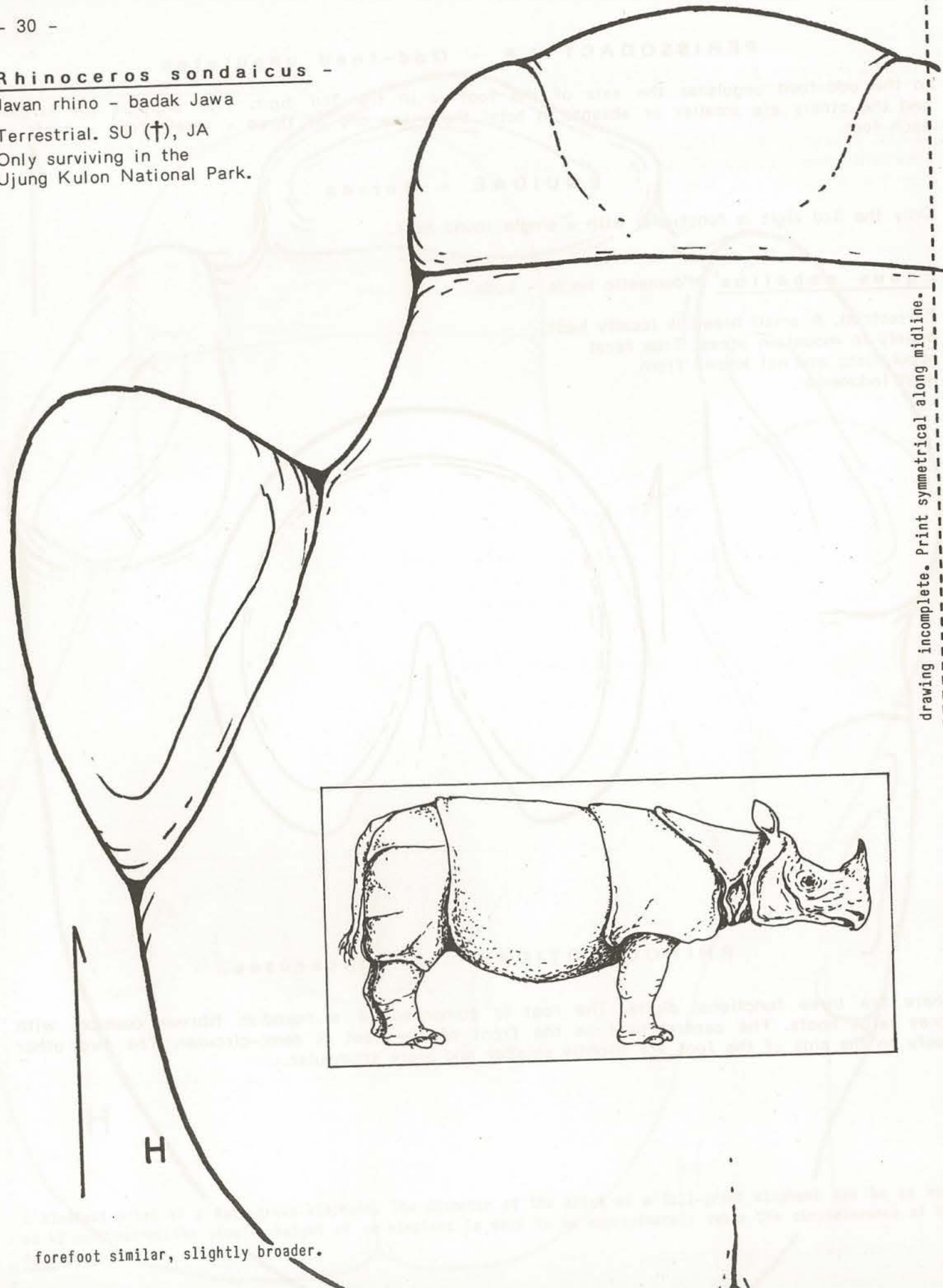


Rhinoceros sondaicus -

Javan rhino - badak Jawa

Terrestrial. SU (†), JA

Only surviving in the Ujung Kulon National Park.



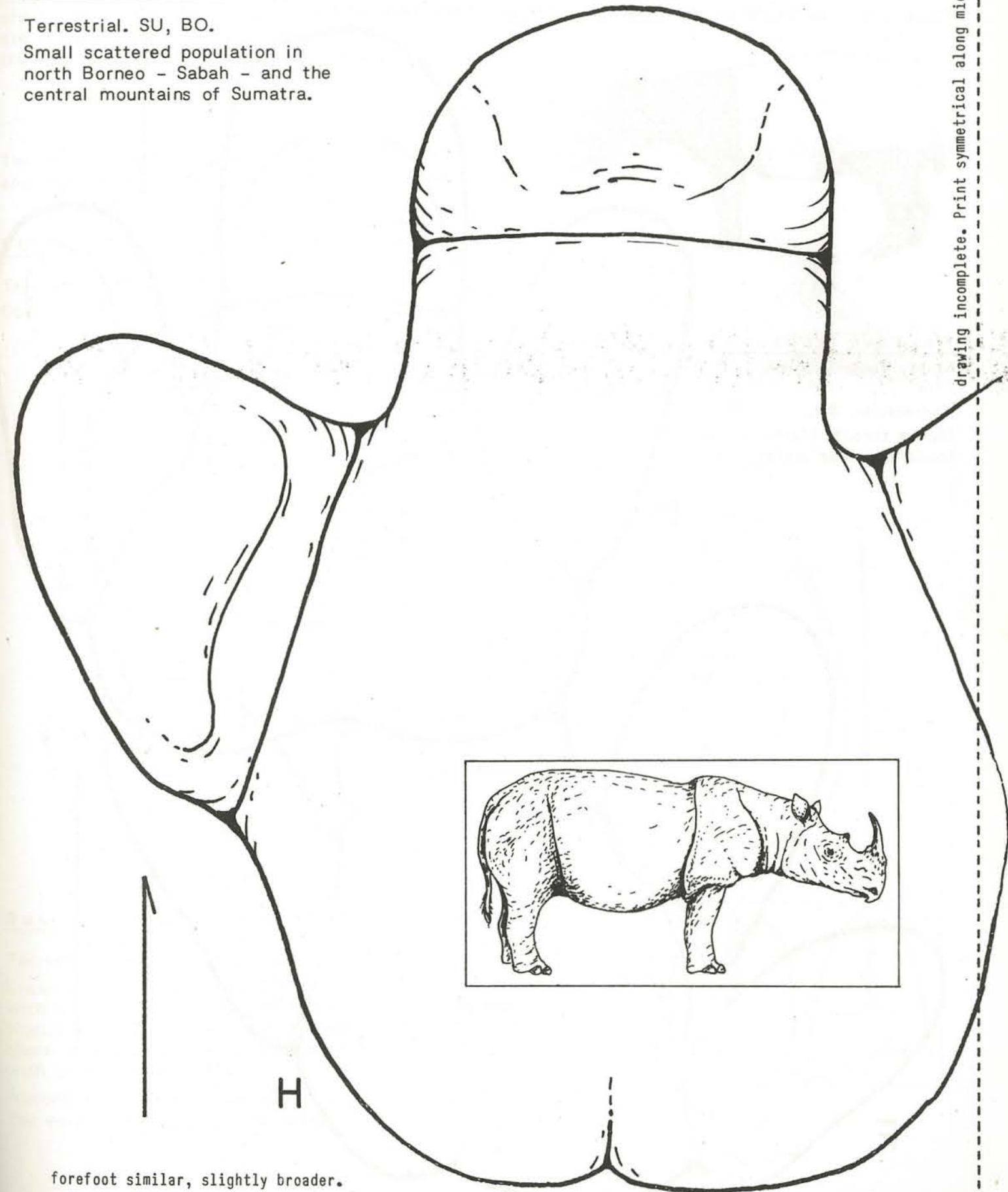
drawing incomplete. Print symmetrical along midline.

forefoot similar, slightly broader.

Dicerorhinus sumatrensis - Sumatran rhino - badak Sumatra

Terrestrial. SU, BO.

Small scattered population in north Borneo - Sabah - and the central mountains of Sumatra.



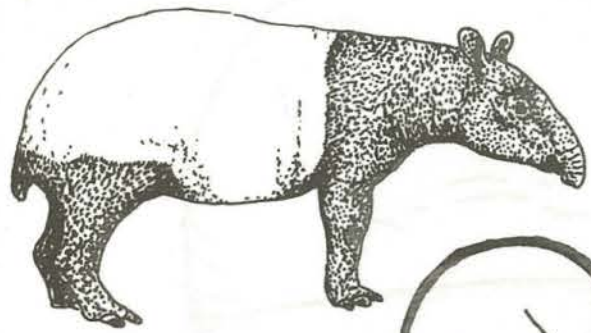
drawing incomplete. Print symmetrical along midline.

forefoot similar, slightly broader.



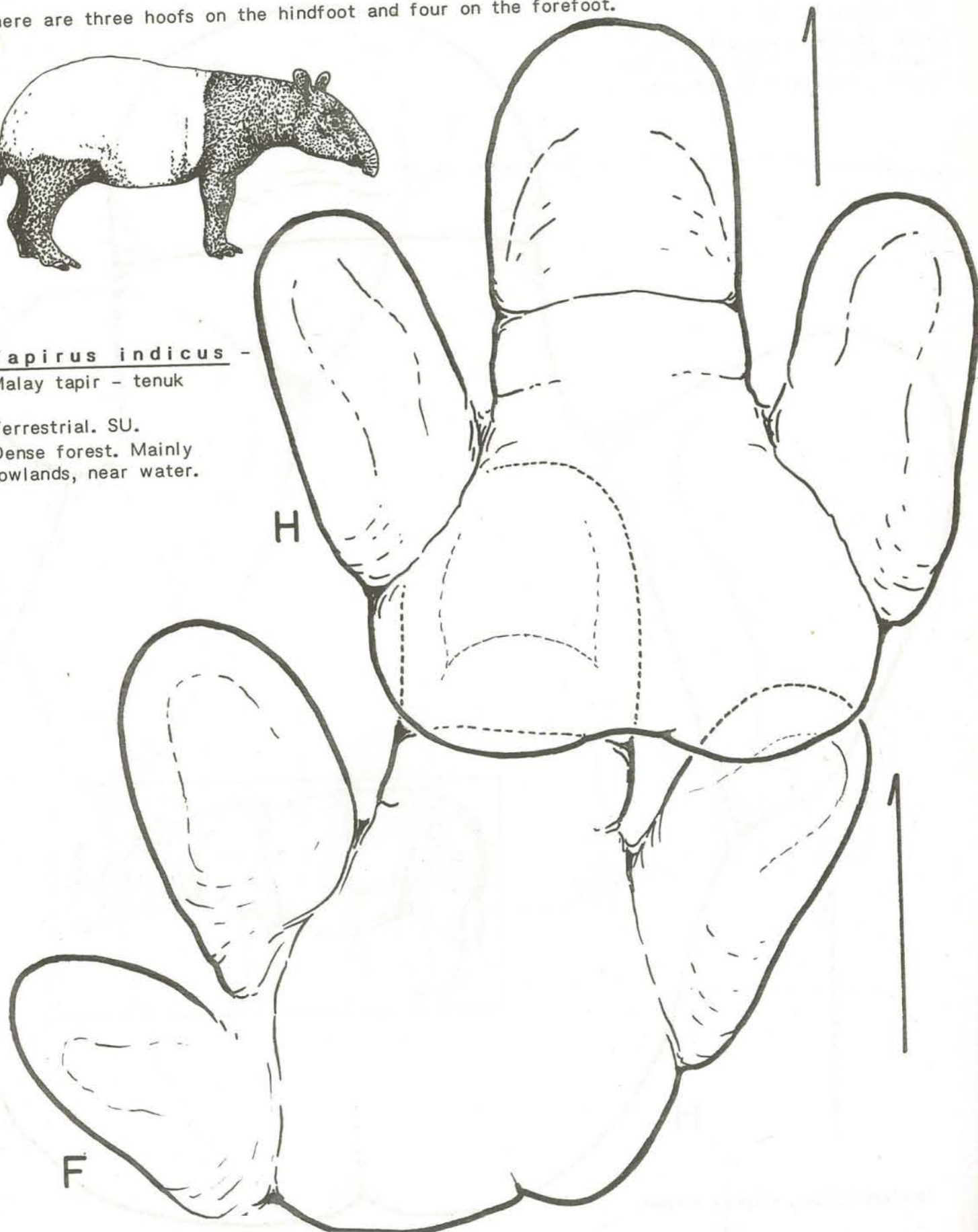
TAPIRIDAE - Tapirs

There are three hoofs on the hindfoot and four on the forefoot.



Tapirus indicus - Malay tapir - tenuk

Terrestrial. SU.  
Dense forest. Mainly lowlands, near water.



ARTIODACTYLA - Even-toed ungulates

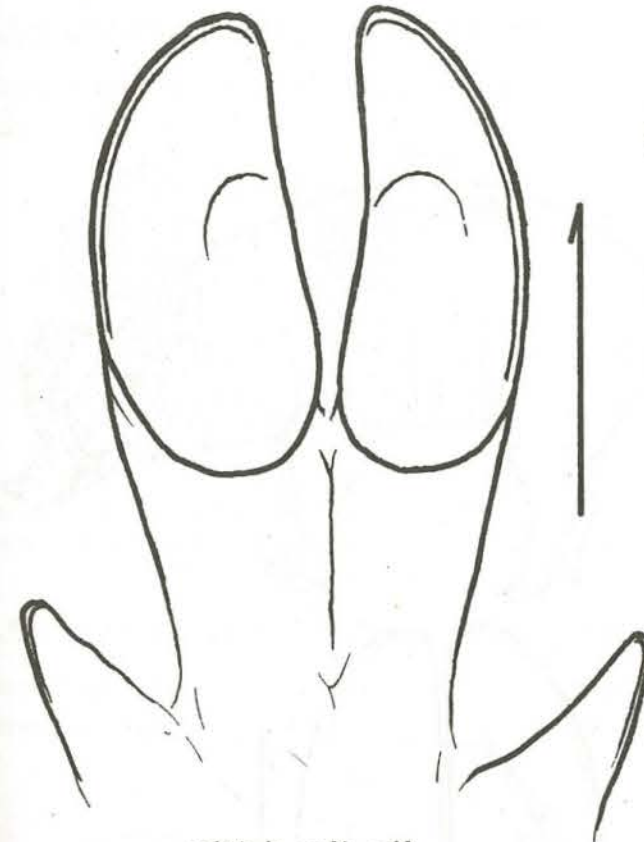
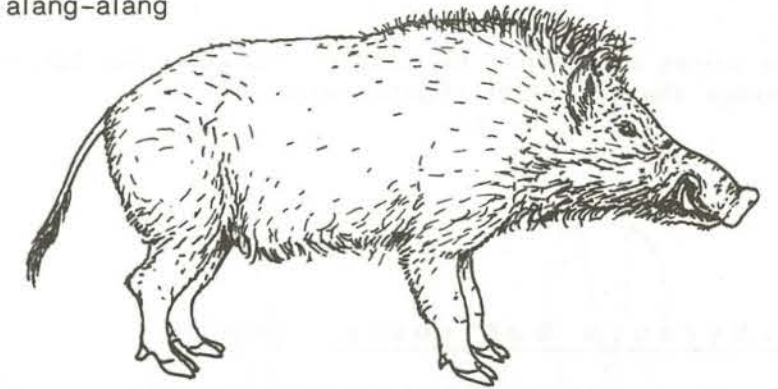
In the even-toed ungulates the axis of the foot is between the 3rd and 4th digit. These digits are equal in size and end in a pointed hoof. The 1st digit is absent and the 2nd and 5th digits are much smaller and shorter, ending in a small hoof - the dew claw - some distance above the main hoofs. Males are usually larger than females.

SUIDAE - Pigs

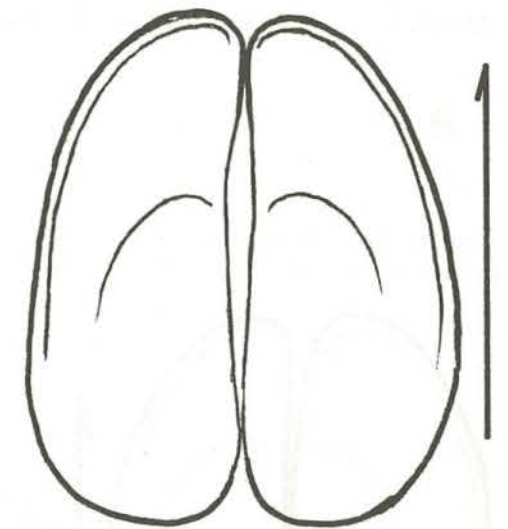
The dew claws are relatively large and placed low on the foot. They normally touch the ground and are visible in the print, except on very hard soil.

Sus scrofa - common wild pig - babi alang-alang

Terrestrial. SU, JA, most smaller islands.  
Common, also near habitation.



print in soft soil

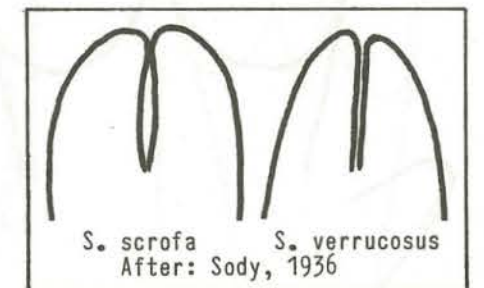


print in hard soil

Sus verrucosus - Javan pig - babi hutan

Terrestrial. JA, Sulawesi, east Indonesia.  
Locally common. Externally similar to *Sus scrofa*, but with warts on the face. The tracks are probably indistinguishable. Both species have been domesticated and there is presumably a large amount of hybridization with other domestic stock.

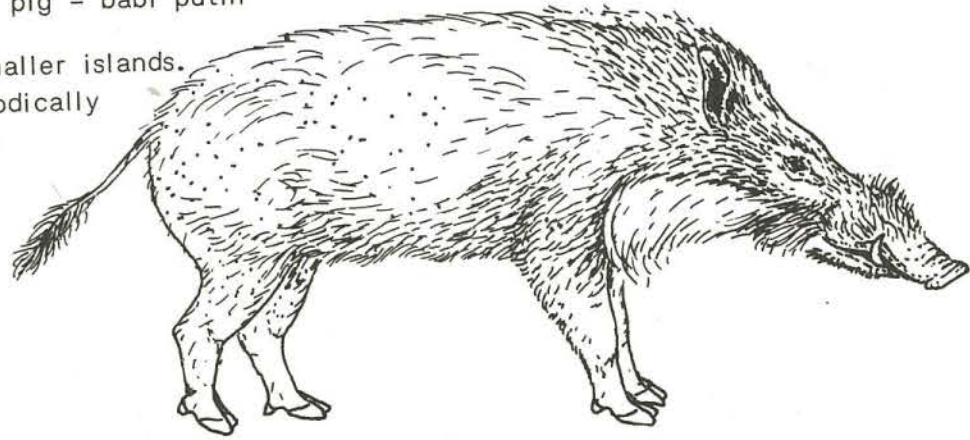
According to **Sody** (1936) slight differences in the form of the hoofs might exist. This needs confirmation.





**Sus barbatus** - bearded pig - babi putih

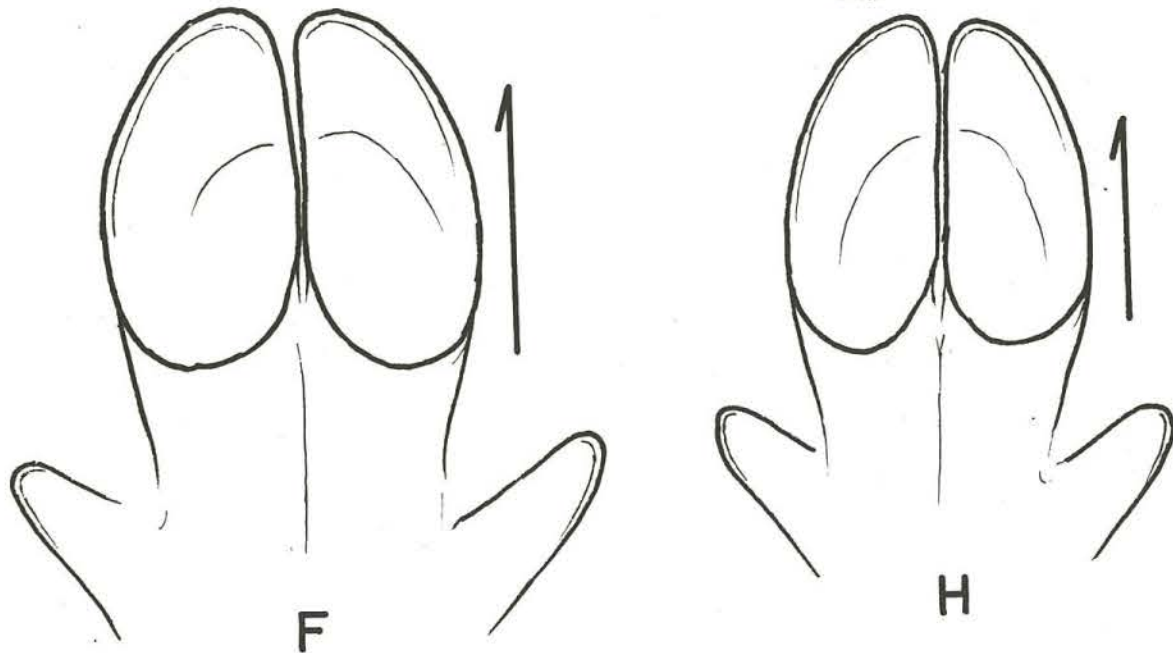
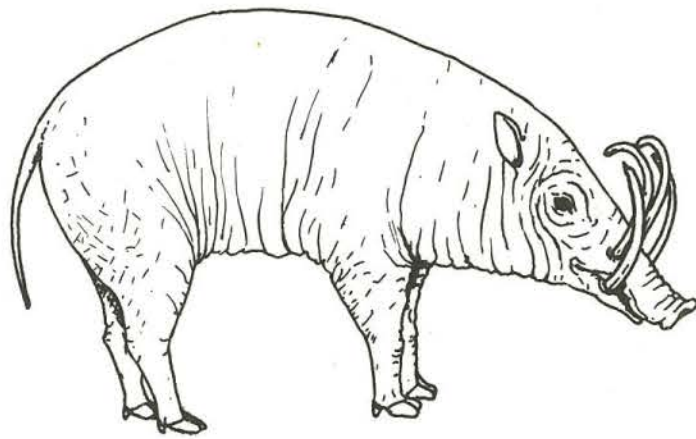
Terrestrial. SU, BO, several smaller islands.  
Forested areas. In Borneo periodically migrating in very large groups.



The prints are similar to those of the other Sus species and probably indistinguishable. On the average they might be slightly larger.

**Babyrousa babirussa** - babirusa

Terrestrial. Sulawesi, Buru, some smaller islands.  
Forested areas.

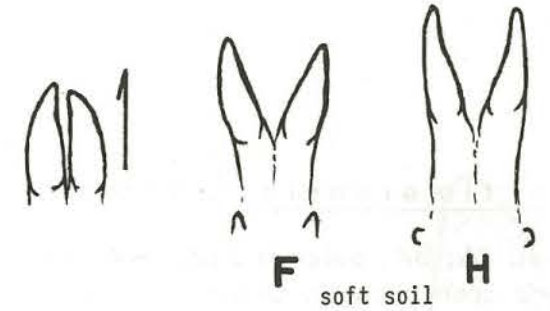
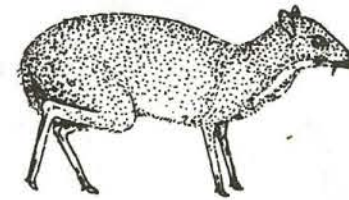


**TRAGULIDAE - Mouse deer**

Very small deer-like animals with tiny slender and pointed hoofs. The dew claws small and only visible in soft soil.

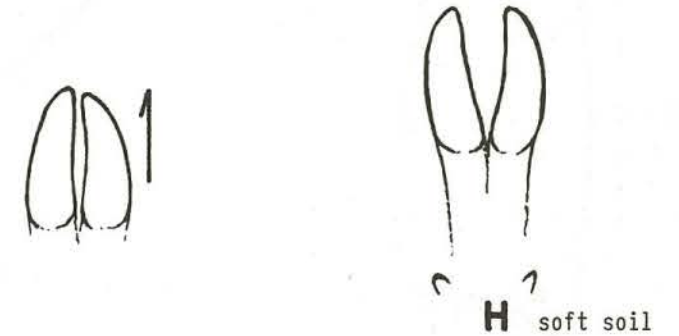
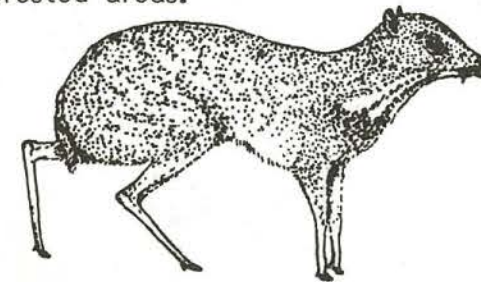
**Tragulus javanicus** - lesser mouse deer - kancil

Terrestrial. SU, BO, JA, many smaller islands.  
Forested areas.



**Tragulus napu** - larger mouse deer - napu

Terrestrial. SU, BO, most smaller islands.  
Forested areas.

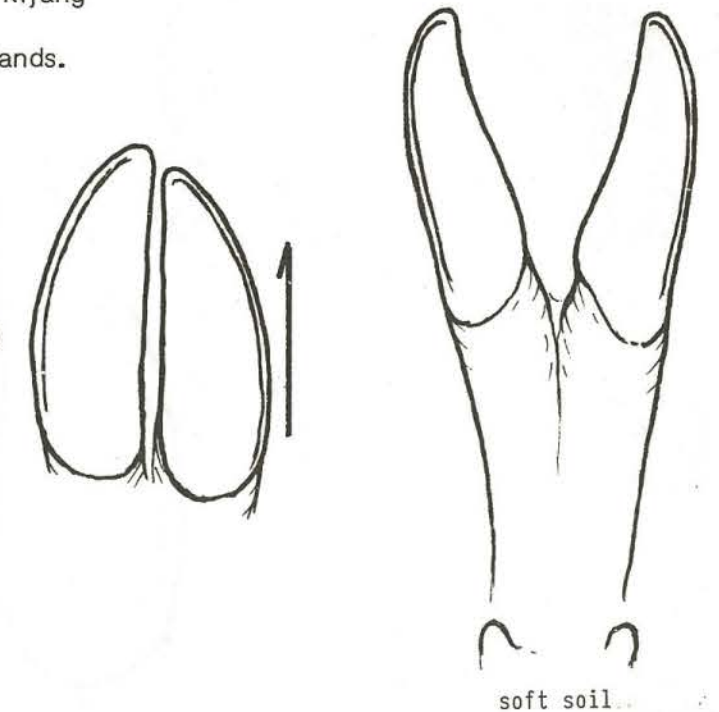
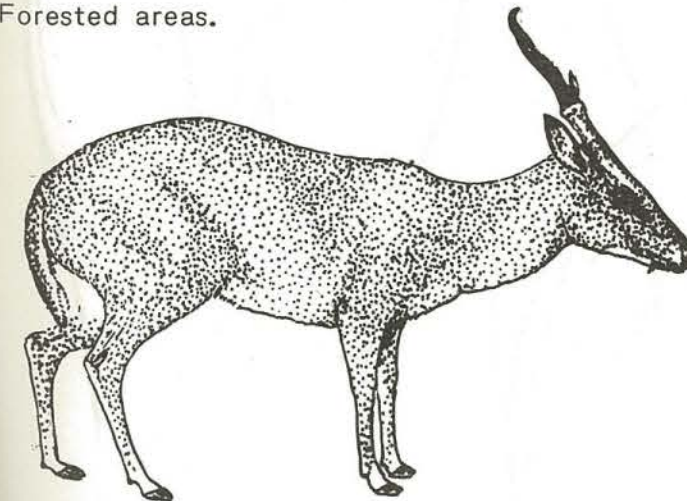


**CERVIDAE - Deer**

The hoofs moderately slender and pointed, together forming an almost triangular print. The dew claws small and high on the foot. They are only visible in very soft soil. The males carry antlers.

**Muntiacus muntjak** - barking deer - kijang

Terrestrial. SU, BO, JA, BA, several smaller islands.  
Forested areas.





Cervus porcinus kuhlii - Bawean hog deer - rusa Bawean

Terrestrial. Bawean island, Java sea.

Forested areas.

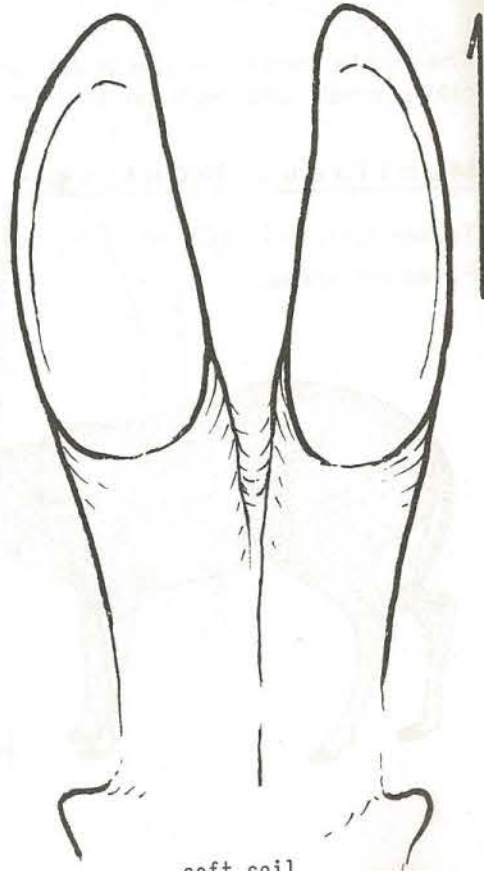
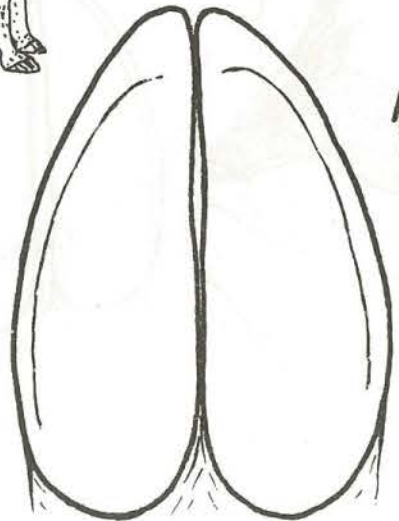
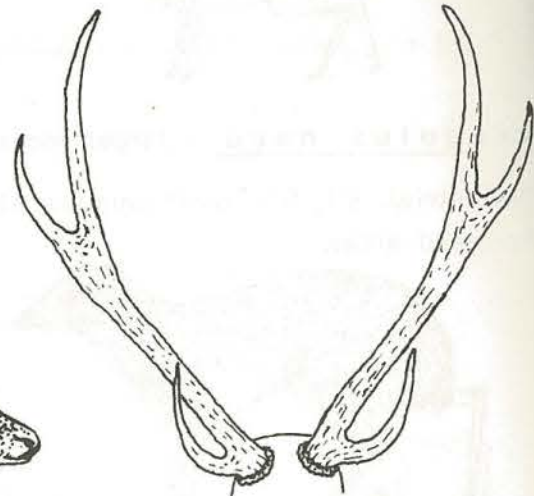
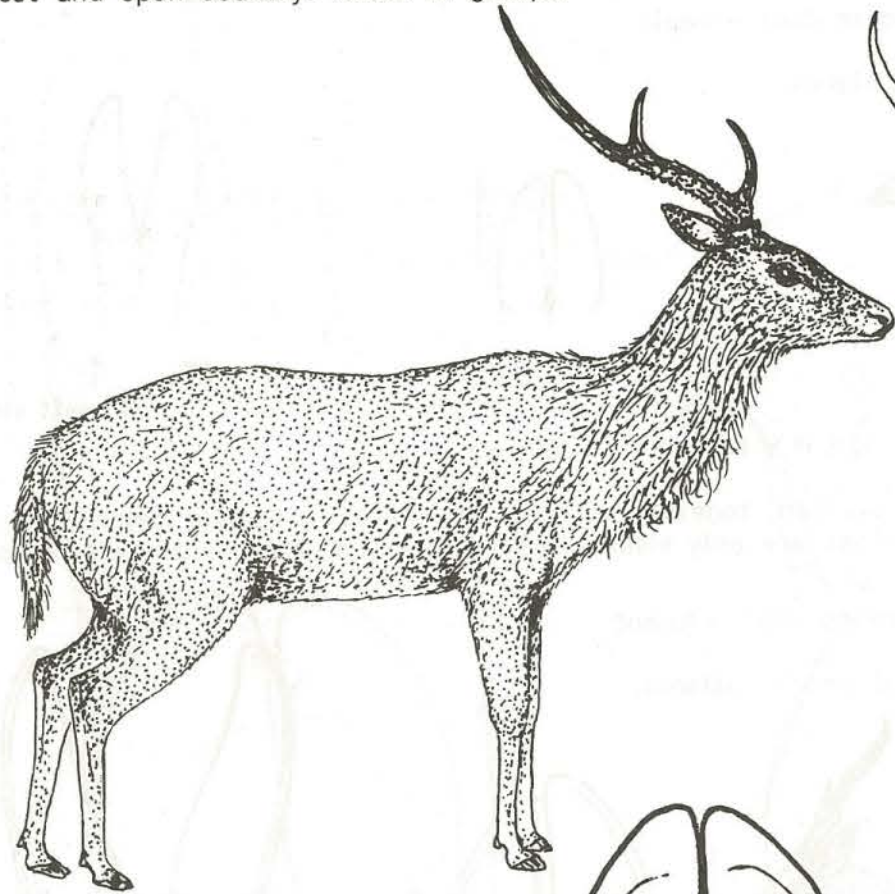
The only deer on the island. The tracks are similar to those of *Cervus timorensis*, but smaller.



Cervus timorensis - rusa deer - rusa Jawa

Terrestrial. JA, BA, Sulawesi, east Indonesia

Forest and open country. Often in groups.



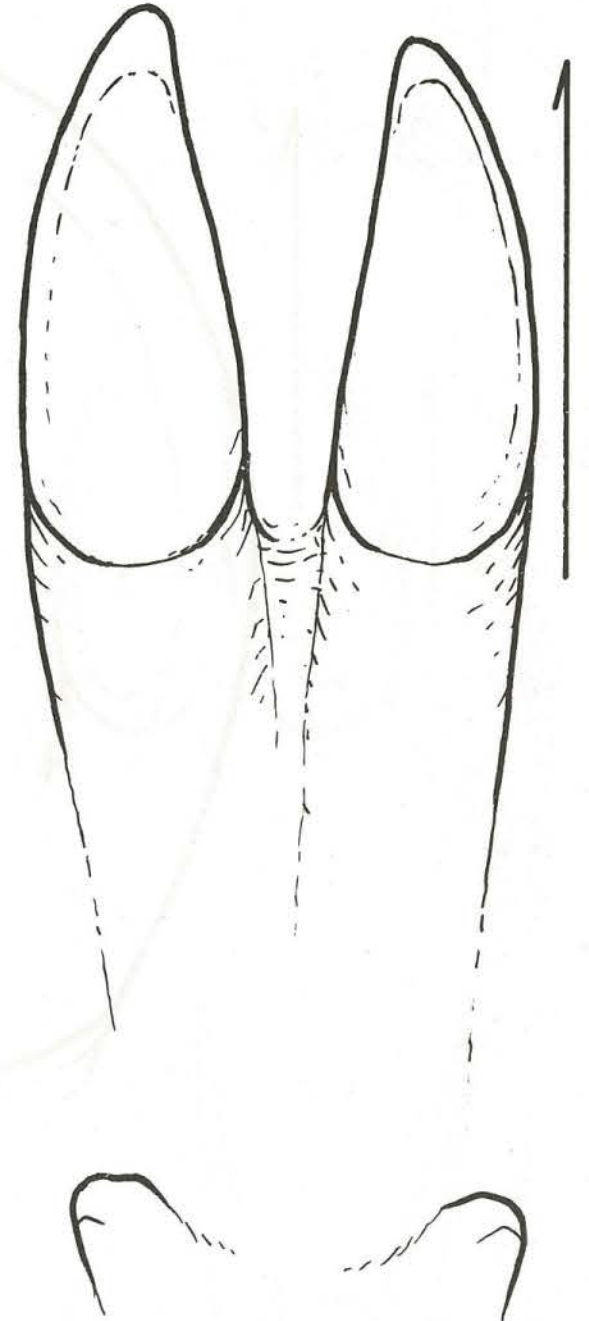
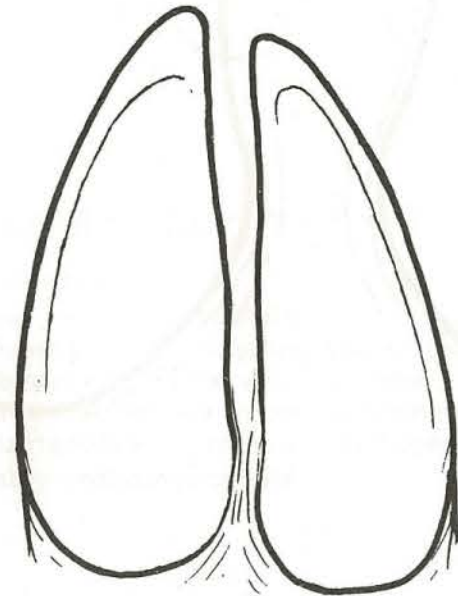
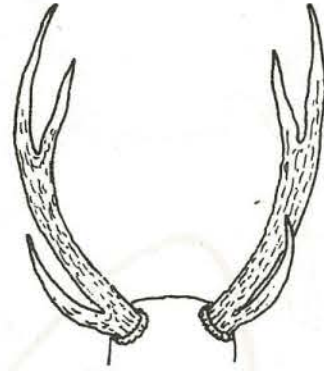
soft soil

Cervus unicolor - Sambar - rusa sambar

Terrestrial. SU, BO, many small islands.

Forested areas.

Similar to *Cervus timorensis*, but larger and with relatively longer legs. The antlers are comparatively short, but heavy and stout, with small angles between the branches. The tail is long and dark.



soft soil

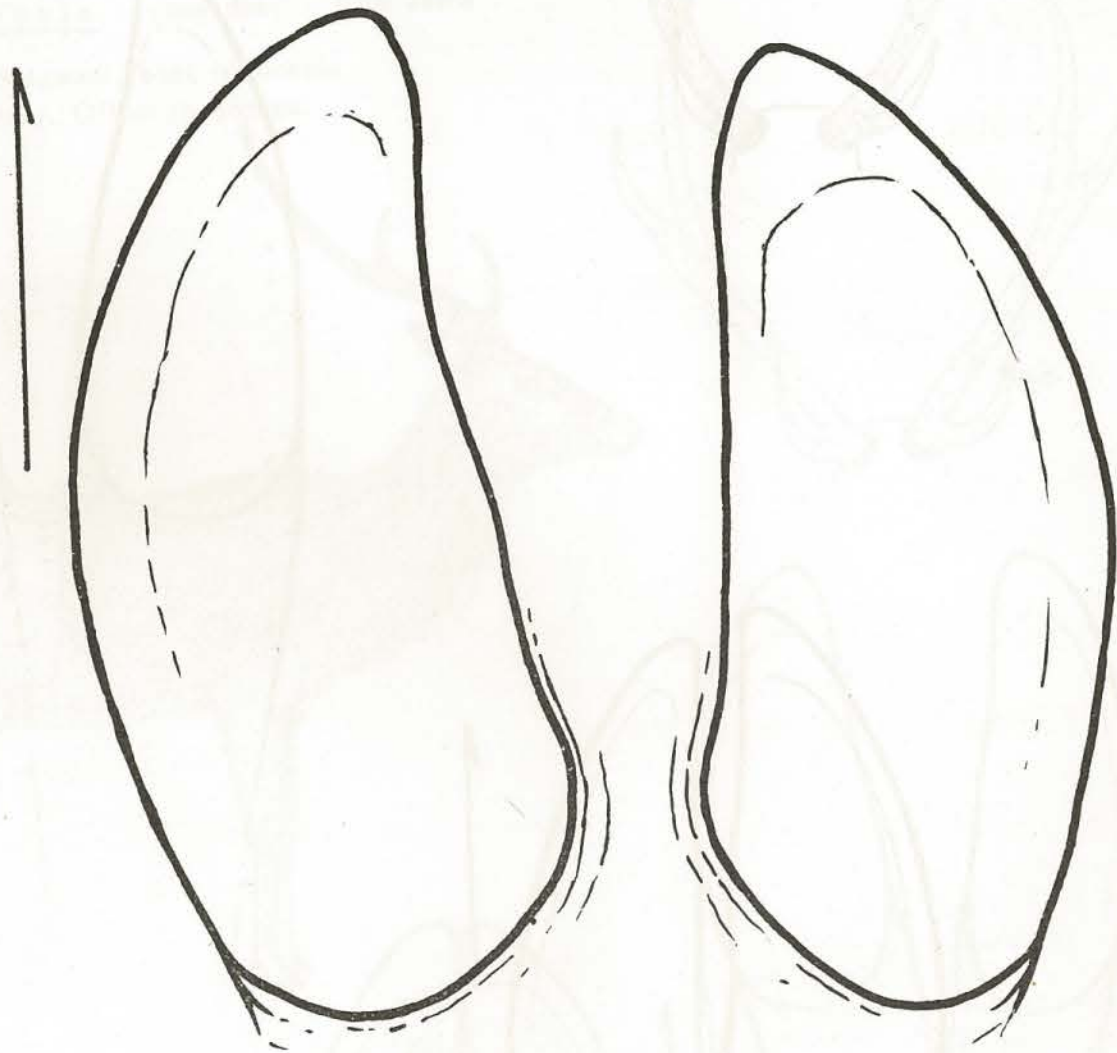


BOVIDAE - Cattle and Goats

The bovids have rounder and less pointed hoofs, with a small ball and often with a strongly concave sole. Both sexes carry hollow horns growing on a bony core, but the male's horns are usually larger.

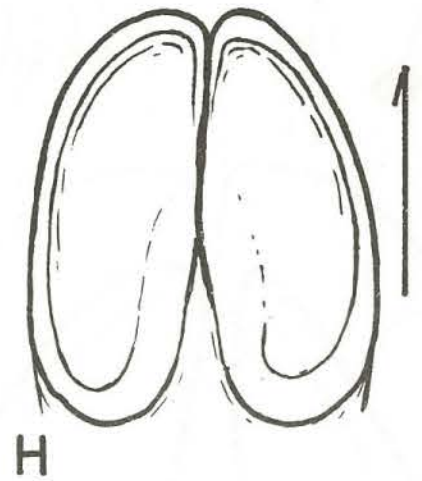
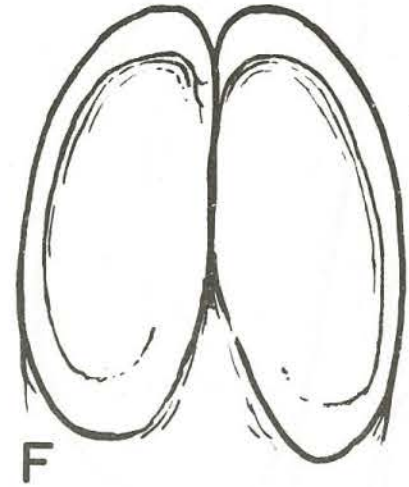
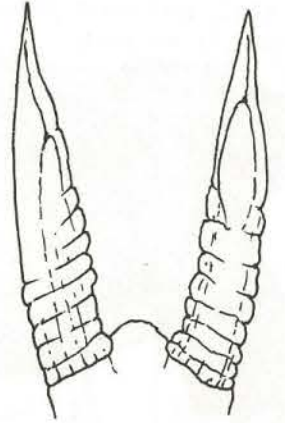
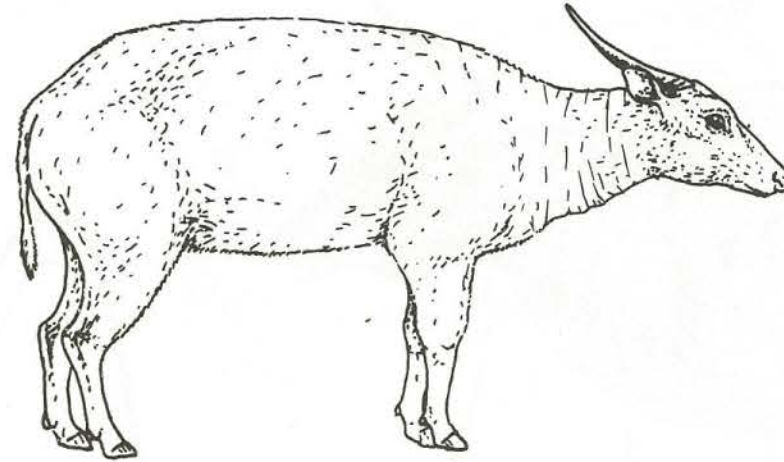
Bubalus bubalus - water buffalo - kerbau

Terrestrial. Domestic form commonly kept. True wild stock might occur in northwest Borneo and feral populations occur in several parts of Java and Sumatra.



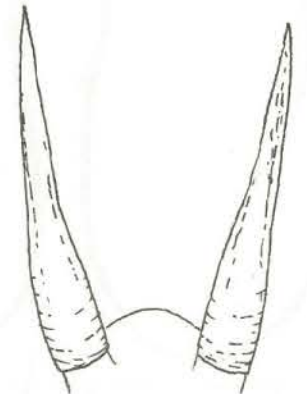
Bubalus depressicornis - lowland anoa - anoa dataran rendah

Terrestrial. Sulawesi.  
Forested areas, mainly lowlands.



Bubalus quarlesi - mountain anoa - anoa pegunungan

Terrestrial. Sulawesi.  
Forested areas, mainly mountains.  
Similar to Bubalus depressicornis, but smaller and the fur more woolly. Lacks white on the throat and legs and the horns are round and smooth, instead of flattened with transversal ridges.  
Tracks probably indistinguishable.

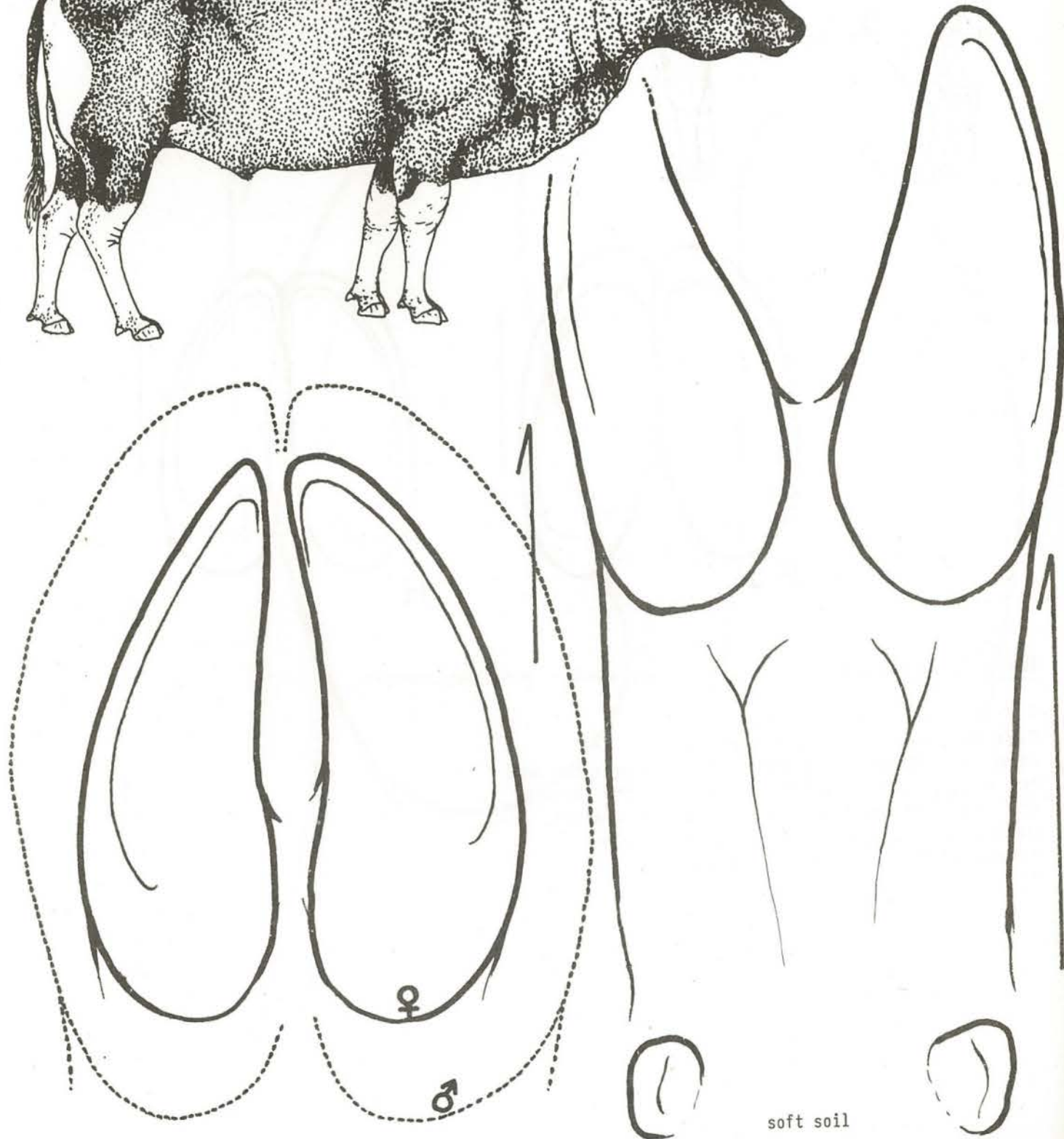
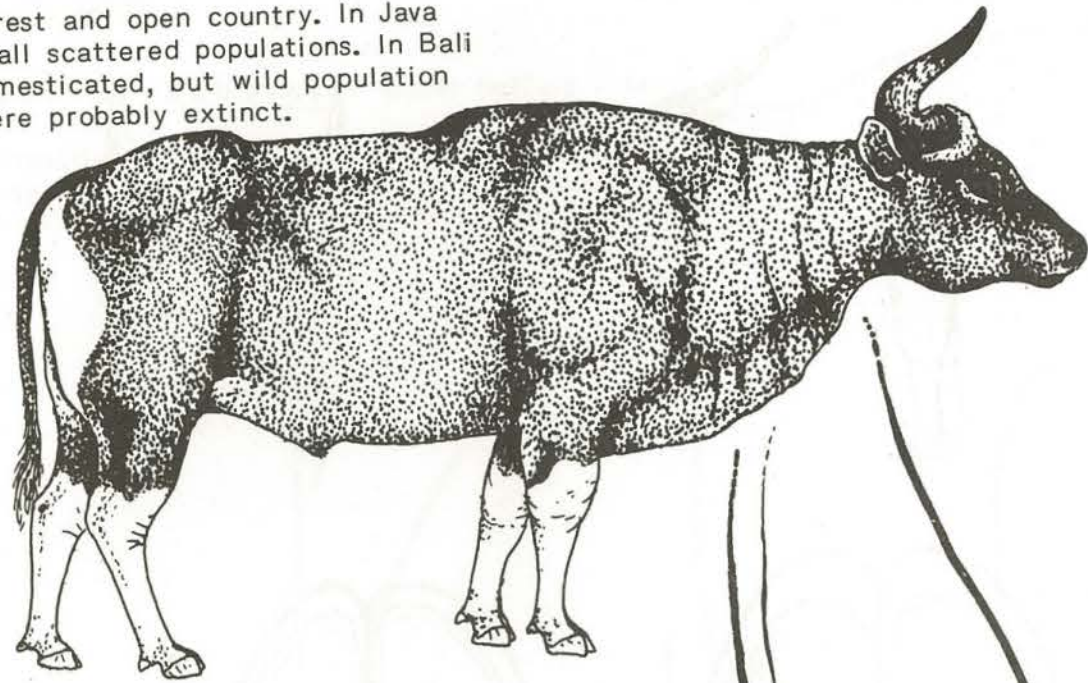




Bos javanicus - banteng

Terrestrial. BO, JA, BA.

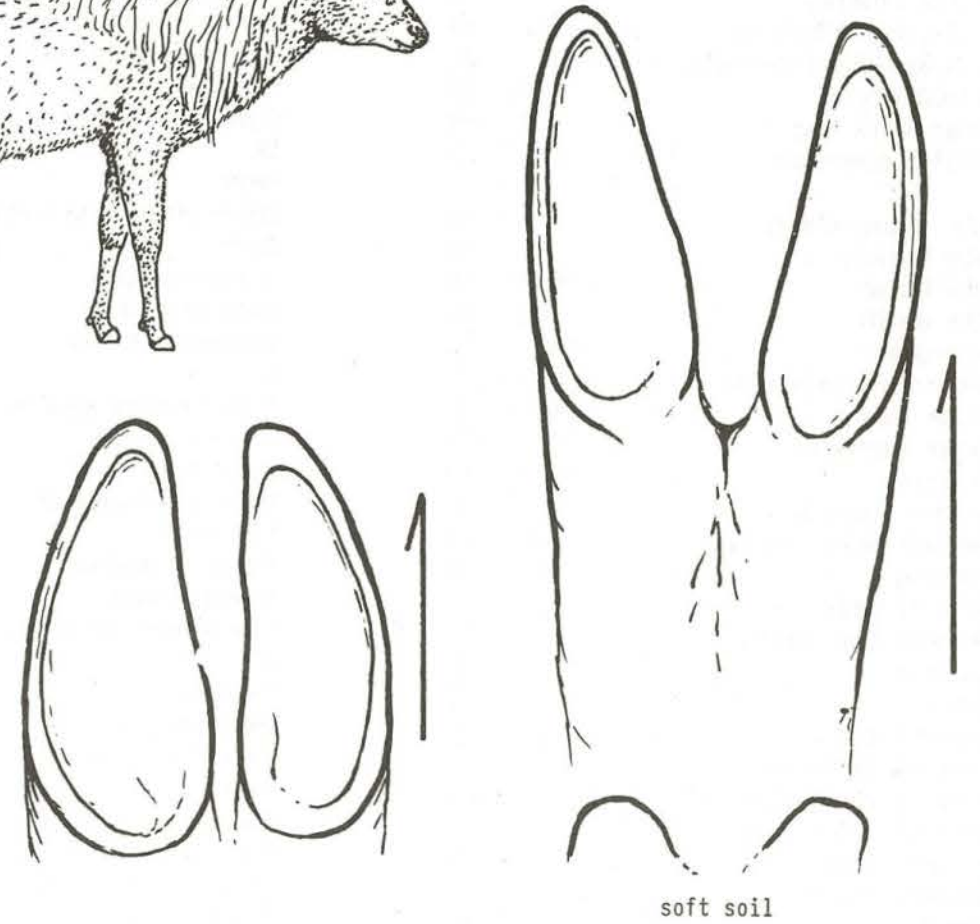
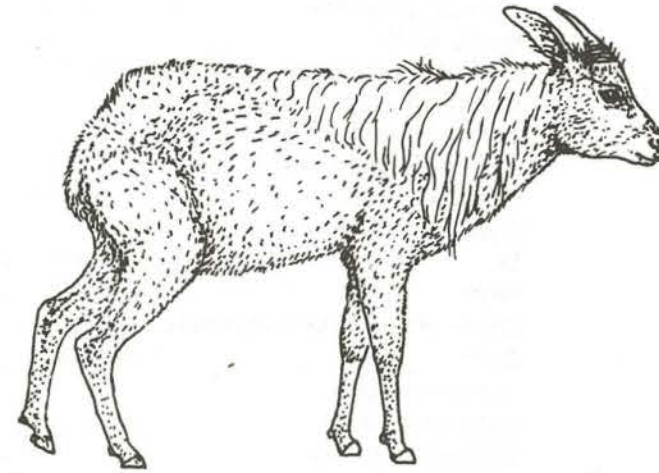
Forest and open country. In Java small scattered populations. In Bali domesticated, but wild population there probably extinct.



Capricornis sumatrensis - serow - kambing hutan

Terrestrial. SU.

Forested areas in the central mountains.





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