

MEMORANDUM ON THE KAHILU SANCTUARY.

BY

D'ARCY WEATHERBE.

WITH AN INTRODUCTION BY THEODORE HUBBACK.

(With two plates).

INTRODUCTION.

Mr. D'Arcy Weatherbe has asked me to write an introduction to his note on the Kahilu Sanctuary in Burma.

He has also asked me to express an opinion, based on his investigations and statements, regarding the value of this place as a Sanctuary.

I am sure scientists and conservationists throughout the world will be interested in reading this entirely disinterested report on what Mr. Weatherbe calls, and rightly calls, a 'so-called' Sanctuary.

Mr. Weatherbe has shown quite clearly that with the exception of the identification of parts of a skull of a *Rhinoceros sondaicus* obtained in the area, there is no evidence at all regarding the species of Rhinoceros in the Kahilu. No scientific data can be based on the evidence of village people, and the testimony of a native Game Ranger is seldom more valuable.

Mr. Weatherbe was satisfied after questioning the Game Ranger in the Kahilu on many matters relating to this area and the Rhino therein that his testimony was unreliable. From Mr. Weatherbe's description, the conditions under which these unfortunate animals exist, due to the failure of the Government to undertake any restrictions to avoid disturbance, makes the title of 'Sanctuary' for such a place a bad joke. In fact I might say that the encouragement to provide disturbance by allowing unrestricted 'Taungya' activities—the cut, cultivate and clear out policy—to go on over 50 square miles of the 'Sanctuary'; by allowing villagers to go in and out of the area as they please; by permitting men armed with guns and accompanied by dogs free access to the area; entirely discount and render ineffective what might have been a permanent and valuable refuge for wild life.

The Sanctuary as organized is valueless as a permanent contribution to the Cause of Conservation.

If the Government of Burma want to preserve the Rhinoceros in this area then let them undertake the work in a proper and business-like manner and try to emulate what has been and is being done in Canada, the United States and elsewhere, and draw up a proper constitution for this area to establish it as a real Sanctuary.

If the Conservation of Wild Life is merely to be looked upon as something which can be carried on so long as it does not interfere with anything else; which requires no special steps to be taken except those which might be described as marks on pieces of paper; then it will fail. The sooner it is recognized by Governments which profess solicitude for wild life, but who take no adequate steps to save it, and spend insufficient money to guard it, that their inactivity is fatuous and fatal, the sooner there will be some hope for a real policy of Conservation.

Mr. Weatherbe's report should be carefully studied. Presuming that the Government of Burma really want to preserve wild life, I feel sure that those in whose hands lie the destiny of the Wild Creatures of that country will take to heart the implications of the report.

T. H.

NOTE ON A VISIT TO THE KAHILU RHINOCEROS SANCTUARY.

The following geographic description of the Kahilu Sanctuary is taken from the report of the Game Warden in 1928 and supplemented by my own observations, as his data about communications are, perhaps, less up-to-date.

Comprising an area of approximately 62 miles, the Sanctuary is situated on the right bank of the Yunzalin river on the borders of the Papun and Thaton Civil Districts, and the Salween and Thaton Forest Divisions. Of the total area 16 miles consist of reserved forests (Kahilu Reserve 11 square miles and balance in the Tagelung reserve). As the portion in the Tagelung reserve is isolated, close to Kyowaing and the cart road, and as signs of rhino are said never to be found there now, it may, perhaps be left out of consideration. The other 46 square miles are public forest land, cultivations and village sites. The boundaries are notified as follows:—*East*—P.W.D.—Papun-Kammemaung cart road from the Kayindon Chaung in the north to Yebu Chaung in south. *South*—The Yebu-Lapotha-Kyowaing village cart track as far as the eastern boundary of Tagelung reserve, thence by the reserve boundary to the Donthami Chaung. *West*—the Donthami Chaung to Pinmalinawik village, thence by reserved forest department cart road as far as the Kayindon Chaung. *North*—the Kayindon Chaung to the starting point. The area may be reached by two routes. The first is from Thaton, on the Rangoon-Moulmein Railway, by motor car to the Dondami river, some seven miles, and then up this river by motor boat 55 miles to where a forest road, 20 miles long, connects with the village of Kyowaing, and this stage can be done, by special arrangement by bus. Kyowaing is at the south-western corner of the Sanctuary and has a comfortable Forest Rest House, while a cart road leads into the Sanctuary to the village of Lapotha, 8 miles from Kyowaing. By starting in the morning from Thaton, one can sleep at Kyowaing Rest House. The alternative route is from

Moulmein to Shwegun on the Salween River, 52 miles by I.F.C. steamer which takes a day. Starting from Shwegun, with a motor boat, next morning, Kammemaung can be reached in about 4 hours, and, by arrangement, a bus can be had from Kammemaung to Kahilu Rest House, a distance of about 16 miles, so that this route takes over a day and a half, at best. The above itineraries refer to the dry weather season. While the total area comprises about 62 square miles a portion of this area nearly 12 square miles in extent within its borders forms part of a reserved forest and it is only this small area that in any way faintly deserves the name 'Sanctuary'. Within this Reserved Forest, there is no cultivation and there are no villages and the forest remains mostly uncut. The trees are largely evergreen and both fruit and foliage of a number of them, provide suitable food for the Rhinoceros. A number of permanent streams of good water intersect this forest reserve. In the portion of the Sanctuary outside the Reserved Forest and comprising some 50 square miles the greater part has been, and is being, annually cultivated by the Taungya method. For the benefit of those unused to this method, it should be explained that it consists, in each year, of cutting areas in the dry season, and, before the rains begin, in burning these areas. Immediately the rains commence, which in this region is towards the end of May, planting with paddy starts. By September the harvest has been gathered, and thenceforth, with the exception of some garden produce, chillies, etc., that particular area lies fallow for as long as from seven to twenty years depending upon the nature of the soil, and its relative fertility.

A very large and annually increasing population is dependent upon the crops grown within the Sanctuary area possibly now totalling 4,000 to 5,000 people. A Forest Official estimated, from official records, that the villages dependent upon this area comprised 669 houses in 1927 (the year before the Sanctuary was constituted), and in 1933, this number had increased to 869. The Game Warden stated in 1929, that 8 of these villages were actually situated within the borders of the Sanctuary itself, and contained 158 houses while 6 other villages were on the border with a large number of houses. Besides the 'Taungya' Cultivation, referred to above, wherever the rivers permit it, irrigated paddy land is cultivated, which with clearings for pasture, take a considerable area out of the total now available for the rhino. No restriction of any kind exists as to the locality or the extent of land cleared and cultivated and the villagers may cut or burn (outside the small area of the forest reserve) wherever or whenever they like. Traffic throughout the Sanctuary is completely unrestricted. Dogs can be, and are, taken anywhere within its limits. Besides cultivation, forest products of many kinds are collected and certain timbering operations carried on also, practically unrestricted. The rivers and streams are fished to extinction. In all of the villages whose inhabitants travel and cultivate, cut trees, or gather forest products, kill vermin and in all likelihood game and other birds, and some of the smaller fauna, fish, and cut tracks, there are licenses for not less than 30 guns. The

Game Warden reported 13 guns in the villages in the Sanctuary alone and a Forest Officer, that in two of the large villages the number of gun licenses increased from 12 to 16 between 1929 and 1933. These guns and dogs may be and are taken into the Sanctuary by a number of their owners who reside within its limits for, or ostensibly for, the protection of crops, lives or domestic animals and with them, or by other means, *any animal* including Rhino, Bison, Sambhur, Hog-deer, Tiger, Gyi, Pig, etc., as well as any birds, may be and doubtless often are destroyed. Only *after* the killing is an explanation necessary. Besides dogs and other form of 'protection' such as trapping, maroons and other noise, fire may be used for the protection of crops, and it must be quite obvious that the constant effect of any or all of the above disturbing agencies must keep the few rhino which are still alive here, in a great state of alarm and tension, and constantly on the move throughout practically the whole year. Besides the effect of this almost daily disturbance and alarming of the rhino, the depletion of their food supplies is serious and cumulative. After burning and harvesting are finished on these 'Taungya' areas the bulk of it comes up in dense bamboo, cane, high coarse reedy grass and thorny bush, none of which is edible by rhinoceros.

Reports during the past decade from various sources, and more frequent of late years, have led us to suppose that specimens of the rarest of all contemporary species of Rhinoceros may still be found at Kahilu in Burma. I refer, of course, to the Javan or Lesser One-horned Rhinoceros (*Rhinoceros sondaicus*). When travelling in Burma during some 5 months in 1937 and 1938, I determined, if possible, to investigate this question on the ground. *One* of the last if not actually *the* last specimens of this species known to have been killed, in Burma, was shot by Theodore Hubback in Lower Tenasserim in 1920. This animal, a female, was mounted and is in the South Kensington Museum. Later, in 1932, a large female was shot in the State of Perak in Malaya. This specimen is likewise in the British Museum. Since the shooting of this last Javan rhino, and with the exception of those reported in southwestern Java, the animal itself has not been authentically reported, as far as I am aware, unless of course, and as one hopes, these rhino at Kahilu, belong to that species. Otherwise, although an odd specimen may still exist elsewhere, in Malaysia or in Indonesia, the possibility is that the death rate exceeds the birth rate, and so for all practical purposes the species must be considered as extinct. It may be imagined, therefore, with what interest I set about my visit to this Sanctuary, where, from all reports, not only were there still survivors of this species, but breeding was taking place. In this quest to try and verify if possible, the statements made, I was given every assistance and hospitality by members of the Burma Forest Department.

It is now over ten years since Burma's first Game Warden, a member of the Forest Service, surmised that the Javan rhino might be found here, and visited the place in 1927. This forest area is not far from the right bank of the Salween River and some 100 miles perhaps, above Moulmein. The Game Warden on

that occasion, was accompanied by another member of his service, and though no animals were seen, tracks and other evidence of the presence of rhino, were observed. In the following year the Burma Government set aside an area of some 62 square miles as a Sanctuary for the rhino in this locality. The place was legally constituted as a Sanctuary in July 1928, and a Game Ranger was appointed shortly afterwards and has remained in that position ever since. In July 1928, a few completely decomposed remains of a rhino were said to have been found by some native women during the rains; but it was also alleged that the whole of this animal was removed by natives. There is no direct evidence as to where the animal had been killed or died, but fragments of a skull said to belong to it were some time later on secured, and sent to the Bombay Natural History Society for identification. The skull was that of a Javan rhino (*Rhinoceros sondaicus*).¹ In 1929, the Game Warden visited the area but was unsuccessful in 'viewing' rhino, though further evidence (tracks and other signs) were seen and his conclusion then was that there were not less than three animals living there. On March 6th, 1931, two members of the Forest Service, on a report of some rhino remains having been found, went to a locality close to the eastern boundary of the Sanctuary, and were shown completely decomposed remains of a rhino which had been, so it was reported, first observed by a villager in October, 1930. When the Forest Officers went there in March five months after its alleged discovery, there were only some bones mixed with debris to be seen in a river bed, to which position it is inferred they had been carried by the freshets, though this is not certain as October to March is normally the driest season. It is stated in the report made by one of the Forest Officers that the villager was frightened to report the find at the time; he reported that there were *dah* (knife) cuts on the sides and belly of the animal when he first saw it. During the same week of the alleged 'find' it was authentically reported to the police that fresh rhino blood was on sale in a nearby village. Notwithstanding all this very circumstantial evidence of the animal having been illegally killed, the conclusion drawn was that it had met its death in a trap, presumably a dead-fall, though no evidence of any kind is put forth in the report to substantiate this assumption. No evidence of identification of the species or sex of this animal exists but I believe it was assumed to be a female. Why, I do not know. Now, to me, the chief importance of these two incidents is the fact that in the first three years of the existence of the Sanctuary, at least two rhinos are known to have met their death there, and though there were two Game Rangers on the ground, nothing was known of the latter event at least, for some five months afterwards. That is what I assume, as I cannot think that, had the fact been known to the Game Ranger, it would have been concealed. I point this out as important, and strongly opposed to charitable opinions expressed

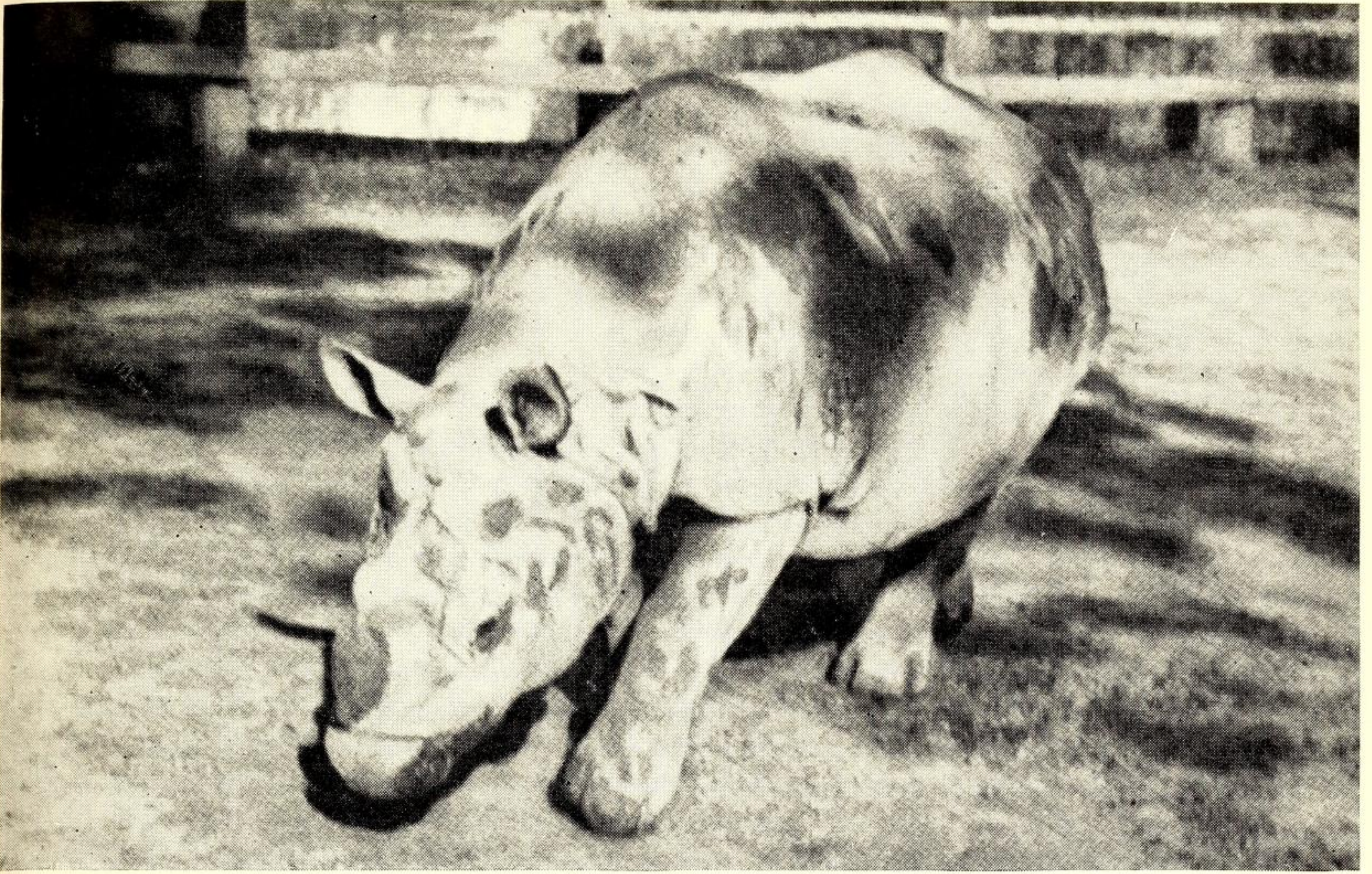
¹ A second and complete skull of *R. sondaicus* was presented to the Society by the Forest Department, Burma in 1933.—EDS.

elsewhere that the rhino at Kahilu are quite safe with the local Karen. The incidents indicate clearly that it is not impossible, especially in the rains, that other rhino may have been killed here, the fact hushed up and the remains completely removed. With regard to the villager's alleged altruistic attitude towards the rhinoceros, I fear I have much less confidence than others who have reported on this subject. Another rather silly piece of native gossip has, by repetition in Forestry reports, been given such prominence that outside readers may accept it as a firm fact, and that is, that superstition would also prevent them from killing a rhino. One of these writers himself, however, naively states: 'but, for a few years before the Sanctuary was formed they (the rhino) were much harassed by hunters, who killed five or six in a comparatively short time.' Is it the inference that altruism and superstition has only become a safeguard *since* the constitution of the Sanctuary, otherwise, why this mysterious 'change of heart' among the Karen? Several thousands of these tribes-people live or depend for existence on the area enclosed in this violable Sanctuary. It surely cannot be seriously contended that among this community, there are no longer a certain proportion, as formerly, who could not withstand the temptation of securing the relatively high remuneration from the products of a rhino, were opportunity easy and risk small? Let us be practical in this matter, and admit that it would be the height of folly to depend either upon the altruism or upon the alleged superstitions of some 4,000 Karen natives for the safety of this handful of rhino. Prevention is much better than cure as unfortunately in this case, the latter does not exist. After the Game Warden's visit in 1929, the next inspection of the Sanctuary by a European was four years later, when a member of the Forest Service was sent there to report on conditions. He visited the place in March 1933, and was in and about the Sanctuary for some three weeks. During this time he reported on having visited the wallows and followed and inspected the tracks of rhino and interviewed natives. This report apparently based, to some extent, on the Game Warden's reports and, similarly to those reports, depends largely on information from local natives and more particularly from the Game Ranger. On the second day of his visit and before he had had an opportunity of seeing the Sanctuary itself this Forest Officer was fortunate in actually *seeing* a Rhinoceros. The spot as indicated to me by the Game Ranger, was on a small stream bed near the northern border of that portion of the Forest Reserve, which lies within the Sanctuary limits. Curiously this was also the first occasion on which the Game Ranger had seen a rhino in the Sanctuary though then in his fifth year of residence. This 'view' is the sole ocular evidence that is on record by any European of the presence of rhino at Kahilu, either before or since the constitution of the Sanctuary, and obviously as most of the other evidence extant points to the present rhino at Kahilu being smaller than mature *Rhinoceros sondaicus*, it is of the utmost importance that we examine the conditions carefully and in detail. First, it will be

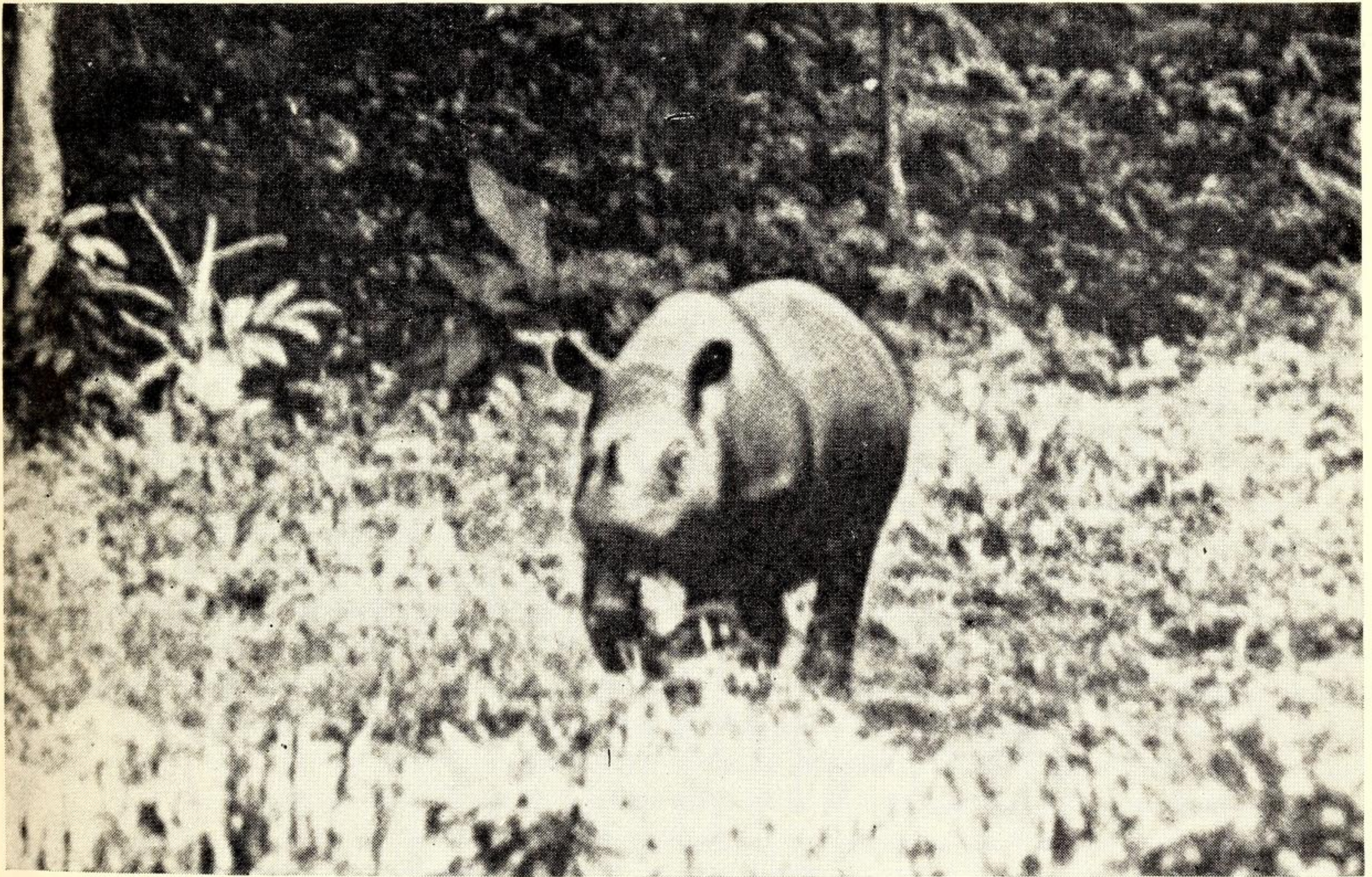
best to give the Forest Officer's own words in describing what he saw.

He writes:—'The animal was encountered feeding with another *which was not seen*. It was walking slowly through the vegetation about 50 yards from me, but was sufficiently clear for me to say that it carried one horn about 9 inches long, set back slightly from the tip of the snout, and to estimate its height as 4 ft. 9 ins. to 5 ft. at the shoulder. It was not possible to obtain corroborative evidence of its species from the texture or folds of the skin, the light being too poor for these details to be visible. *The shade was so dense* that at 8 o'clock on a sunny morning, I should have required a flash-light apparatus to photograph the animal.'

I have questioned the Forest Officer as to this view, but, as it was some five years after the occurrence, he could not, without his diary, give any further details. He emphasised the indistinctness of the animal, that it was at least 50 yards away, and that the light was exceedingly bad. As a photographer, I am not clear as to the import of his reference to the use of a flash-light in daylight, but on one point, he is emphatic, and that is that he was definitely unable to identify any details of the animal's skin. As this is really the most important evidence that he might have got had conditions been better, it leaves us practically in the dark as to the species of this animal. A rhino, about 150 feet away, in thick bush, in semi-darkness, plastered with mud as he would have been having just come from a wallow, would, indeed, be a very difficult beast in which to identify details, yet, the Forest Officer does not hesitate to estimate his height within 3 in.; i.e. between 4 ft. 9 in. and 5 ft., and estimates his horn at 9 in. in length. (The record *R. sondaicus* horn is $10\frac{3}{4}$ "), and that he was a male; but perhaps that was inferred from his having a horn, and therefore, that another rhino whose tracks *only* were seen later on, was a female. Now referring to the horn, published in the last issue of this *Journal* are three photographs of rhino (*vide*, the Two-horned Asiatic Rhinoceros (*R. sumatrensis*); Theodore Hubback, *J.B.N.H.S.*, vol. xl, No. 4, pp. 594-617, pls. iii, iv, and vii). The first two were taken in a much better light than in the case of the Kahilu rhino, as, instead of having to use a flash-light, they were taken in daylight, not long after midday, in an open salt-lick. One with a stop of F3.5 and $\frac{1}{8}$ of a second exposure, ('A') and the other ('B') with a cine camera. They are unique and I believe, the only two photos of a *Dicerorhinus sumatrensis* that have been taken in natural wild conditions, and yet both might be of a one-horned rhino. The posterior horn of the *D. sumatrensis* may be so insignificant as to be unobservable, even in a fairly good light, and, as both male and female have horns, that feature of the animal is not sufficient, alone, upon which to base its gender. The other photograph I mention and exhibit is one of a *Rhinoceros unicornis* ('C'), taken by myself with F8 and $\frac{1}{25}$ second in broad daylight, and at ten yards distance (in captivity, it may be observed). It would be difficult to swear that even this beast in



The Great Indian one-horned Rhinoceros (*Rhinoceros unicornis* L.) approaching camera.



A male Asiatic two-horned Rhinoceros [*Dicerorhinus sumatrensis* Cuv.] in a salt lick in Malaya.

(From a photo by T. R. Hubback. Copyright reserved.)

that position had one horn or two, and under difficult light conditions, quite impossible. In this connection a note from C. W. Loch's interesting article in the *Journal* of the Malayan branch of the Royal Asiatic Society, September 1937 is interesting. It states:—'It must be remembered that all statements of occurrence of the *sondaicus* are open to doubt, though given in good faith. The identification of the species can only be accepted from persons competent to give an opinion on the matter. It sometimes happens that the second horn of *Rhinoceros sumatrensis* has been broken off and in any case natives cannot by any means distinguish between the two species. *In fact the animal can only be definitely identified when a specimen has been shot and examined at close quarters.*'¹

Rhino, like buffalo, and some other animals, crave, indeed must have, wet and muddy places in which to wallow, many of which, doubtless, contain mineral salts or medicinal earth, which seem also to be a practical necessity to the well-being of the larger fauna, and not least of them, to the Rhinoceros. Before visiting Kahilu, I had asked a number of people as to whether any of these salt-licks as they are called, occurred in the Sanctuary, but none could tell me. As these places are usually the most favourable in the jungle in which to observe or photograph, one of my first questions to the Game Ranger was as to the locality of any salt-licks, but he could give me no information nor had he, so he said, ever observed any. By chance a rhino visited one of the largest wallows the day after we were there, and gave unmistakable evidence of eating and licking the ground at one special place. The Ranger saw and confirmed this occurrence himself.

Even in the comparatively small area of the forest reserve, within the Sanctuary limits, the rhino are not entirely free from disturbance, there being a well used footpath from the village of Lapotha to Shweye which passes directly through the reserve from north to south. Certain villagers have the right to collect forest products within the reserve, and do so, and every stream is fished whether they have the right or not. The Game Warden in his report states that one village also has the right to hunt in the reserve and certainly turtles, lizards and other vermin are hunted within its limits; and all the streams show signs of constant 'cutting of tracks'. Dogs, of course, are taken on these peregrinations. So that even in here, there is no immunity from disturbance. Cultivation, however, is not carried on there—and food supplies, to my knowledge, consisting of at least two varieties of trees, and one fruit (and probably a number more of each), exist in fair quantity. The Rhinoceros is a ranging animal and the area of the forest reserve alone would I should think be too small for a number, all through the year. Though the Game Warden and Forest Officer in their reports agree that the few animals remaining here are largely confined to the reserved forest, and from what I have written above the reason must be quite obvious, one reason for their

¹ The italics are mine.

leaving its comparative protection and peace, is the practical necessity to visit the wallows and salt-licks, outside the reserved forest, more especially at the latter end of the dry season, when so many of these places are rapidly drying up. The attraction or possibly the necessity for certain fruits or other food might also necessitate their travelling beyond the boundaries. But it is apparently very rare to find their tracks outside the Sanctuary border. I visited the place at the end of March arriving on the ground on the 30th of that month, and leaving on April 6th. During that period, we had only two hours of rain which did not in anyway interfere with the very strenuous work of my examination. Besides the Game Ranger, and his Assistant, there were with me in camp and during the period of my sojourn on the ground, the chief Forest Ranger of the Division, the local Forester of the Reserve, and a Forester, who accompanied me from Thaton, and who spoke English more or less fluently. The Forest Ranger has a good knowledge of English and the Game Ranger and the assistant understand it passably. With one exception, I visited all of the wallows, said by the Ranger to be known to him, and some of them several times, but I cannot help thinking that there must be others which we did not see, unknown to him, and also that more of them are salt-licks than he realizes. In fact he, as I have stated, had apparently not known that any of these wallows were 'licks' until I pointed out that probability. The one known wallow (said never to dry) which I was unable to reach, though we tried to do so, lay too far away to go there and back in one day, under the existing conditions of the jungle. I think that I visited, practically the whole area, frequented by rhino, at that season, and though we did not actually see a rhino, we narrowly missed doing so.

Besides visiting and carefully examining many wallows and their surroundings and photographing and measuring tracks for 7 to 8 hours each day, I followed rhino paths and stream beds, where their tracks followed or crossed. Though I observed a great number of foot-prints of rhino, I only saw a comparatively few places where they had fed or slept or other signs of the animals except mud-smears near the wallows, but what impressed me most were the remarkably few droppings either fresh or old, that were to be seen. In only one place were they deposited in any quantity and these might have been a year old. This might be thought the more surprising in comparison with the large number of tracks seen, but to me it constituted the very strongest evidence of the very few animals that exist, in this locality. It must be remembered that at the time of my visit 6 months of the dry season had passed and tracks in soil containing any clay ingredients at all, might remain for years on end, unless obliterated by rain. In this jungle, wind may be disregarded as a disintegrating agent, though in parts of Africa and elsewhere it is the only one. The clearest and most easily measured tracks I saw were in a baked wallow, on an eminence, and probably at least two months old. I saw them in April and the last rains, of any amount, before that were, I believe, in February. I venture



Footprints of *D. sumatrensis* in dried wallow.
(Widest measure of print $7\frac{1}{2}$ in. The spectacles are exactly $4\frac{5}{8}$ in. across).



Footprints of *D. sumatrensis*.
(The widest track at Kahilu, under 8 inches and fairly fresh).

to suggest that these two points have not been sufficiently taken into account in previous estimates of numbers of rhino remaining.

The Measurements of Tracks.—I measured I should think, in all perhaps some thirty or more separate footmarks though I saw a good many more. Wherever there was any chance to take an accurate measurement of the width I did so with extreme care. I used for the purpose a 5 foot tested tape measure, graduated in inches and tenths on one side and millimeters on the other. The Forest Officer in the report already referred to does not say how his measurements were taken. I understand that the Game Ranger's estimates were used in some cases. The Game Ranger's measurements, wherever I saw him make them, were, literally, by rule of thumb (and finger); he apparently does not carry a measure.

Some Comparative Characteristics of the Java Rhinoceros and the Two-horned Asiatic Rhinoceros.—The first of these animals, when mature, stands 5' 6" at the shoulder or even more. The width of the fore foot of a mature animal might be from 9" to 11" or wider. His coat has polygonal scales and is heavily folded round the neck with a deep double fold underneath. It is characteristically folded down the back of the shoulder and across the top and below the fore legs, almost as if a cape were worn. There is a fold in the skin down the junction between the hip and body. There is sometimes a slight fold across the rear and upper portion of buttocks as in the *R. unicornis*. The skin, however, is not so fantastically folded, as this latter species. The single horn of the male *sondaicus* is generally wide at the base and in great age, is often, much worn and splintered. The record length is only 10 $\frac{3}{4}$ ". The female sometimes carries a horny nasal protuberance, in that position. The head of a *R. sondaicus* is bigger and heavier than *D. sumatrensis*, while the muzzle is not as short or square as the other one-horned rhino, but is inclined to be long and rather pointed or rounded and the upper lip overhanging.

The *D. sumatrensis*, both male and female, carry horns and the posterior one, *even in the male*, is often so insignificant as to be negligible at a distance. This is the smallest of all the existing species of rhino, measuring, in the mature animal, only four feet to about four feet six inches at the shoulder. The width of the foot of a full-grown two-horned Asiatic rhino, is from 6 $\frac{1}{2}$ " to 9" in width, but rarely of the latter width. His skin is much smoother than the *sondaicus* without the abnormal folding and wrinkling of the skin round the neck. The curious appearance, almost like the *R. unicornis*, of the skin of the *sondaicus* nor its scales has ever even been referred to in any report of the rhino at Kahilu, either by Europeans or natives, that I have heard of, yet it ought, as I have tried to show, to be a much more certain identification than the horn, to the uninitiated. I submit photographs which will more or less clearly show the difference, mentioned above, but unfortunately, have not been able to provide one of the male *sondaicus*.

The Rhinoceroses at Kahilu.—In critically examining all the data we have of these animals, our obvious main quests are as follows:—

1. What are their species?
2. How many animals exist there today, and of these how many are (a) male, (b) female, and (c) young or immature?
3. What evidence have we of breeding in the past?
4. Can breeding go on under present conditions? or if not—
5. What are the prospects of breeding under improved conditions?

Beyond the mere fact that we are certain that a few rhino exist at this place on close analysis, the sum total of our evidence as to (1), (2) and (3), is lamentably small, indefinite, and often conflicting.

It consists wholly in the reports already mentioned, the periodic reports of the Game Ranger, and with what meagre further details, confirmatory or otherwise, and largely critical I fear, I have been able to supplement the above.

As regards (1), there does not appear to be sufficient ocular evidence to settle the matter for a moment, the only reliable ocular evidence, in my opinion, being that of the Forest Officer which as I have, I think, clearly shown is inconclusive. Neither the first Game Warden nor I have seen a rhino at Kahilu and even assuming for the moment that the Game Ranger's testimony of having seen rhino twice (other than the case of the Forest Officer's rhino) is true, the first occasion, at night *with a torch*, may be ruled out, for our purpose of identification, and no definite identifying evidence has been offered in his second case, I have elsewhere pointed out in detail the reasons why I cannot accept this testimony as conclusive either.

So that our case for *R. sondaicus* rests, first on the evidence of fragments of a skull having been identified by the Bombay Natural History Society as *R. sondaicus*, and second on the measurements of footmarks and mud smears on trees, etc. As regards the first, where did it come from? It is alleged that it was found among bones and debris, in the rain, by some native women. There is no evidence that it was not the leaving of a poacher, brought to a village long before, but even if from an animal killed here in 1927, eleven years ago, it need have little or no bearing on the animals living here at present, and in their identity alone are we at the moment interested. I am not clear as to the suggestion that these animals must be *sondaicus*, because the *terrain* is not 'sumatrensis country.' I do not quite know what is meant by the term. Although today these almost extinct animals are where you find them, there was no such thing as *sumatrensis* or *sondaicus* country in the past. Let me quote an extract from Waller's *Das Indo-Malay Archipelago und die Geschichte Seiner*, published in 1902. It says, speaking of the Javan Fauna, 'the Javan Rhinoceros (*Rhinoceros sondaicus*) "Sarak" in Javanese and "Badek" in Sundanese, differs from that in Sumatra in having one horn instead of two. *It ranges over the highest mountains and its regular paths worn into deep*

channels may be traced up the steepest slopes, and round the rims of even active volcanoes.' The italics are mine, and I may observe that the volcanic mountains in Java are sometimes over 10,000 feet in height!

The description of *D. sumatrensis* in *Encyclopædia Britannica* describing the fauna of Sumatra states: 'The Sumatran Rhinoceros differs from the Javanese in having two horns like the African variety. *It is commonest in the marshy low lands*, but extends to some 6,500 feet above sea level.' Again the italics are mine. In lower Burma until the *sondaicus* became extinct both they and the *sumatrensis* lived in the same country. In 1920, a *sondaicus* was shot in Lower Tenasserim and the hunter during the same visit got up to a *sumatrensis*. In Malaya, in lower Perak and Northern Selangor, both species were found in the same country. Though generally speaking, the *sumatrensis* are fond of the mountains and one would not, perhaps, expect to find *sondaicus* there now, one was actually tracked right across the high ranges from the Pak Chan Valley to the lower Tenasserim coast. Rhino, supposed to be *sumatrensis*, are, I believe, today, found in another part of Burma in country not dissimilar to Kahilu, and in Indo-China the habitat of each was not dissimilar. So far as the measurements of footprints go, those made by the first Game Warden, the Forest Officer, and myself do not vary greatly, and the reliable records in firm ground would probably indicate feet between $6\frac{1}{2}$ and $8\frac{1}{2}$ inches in width. All these measurements and the mud smears would indicate animals rather of the *D. sumatrensis* than of the *R. sondaicus* species; or, if *sondaicus*, then, the measurements made by us must all have been of immature animals. There is, of course, always the bare possibility that here we have an undiscovered, or still unidentified species, or sub-species. Now with reference to (2), I was at Kahilu at exactly the same season as the Forest Officer. The Game Ranger stated that all climatic and physical conditions were identical and presumably so they would have been. I have already pointed out and it is obvious to anyone who has travelled in this particular place and under similar conditions, that *unless* one has actually seen tracks in a spot where he has been a short time previously, and seen none, it would in the great majority of cases, be impossible to accurately estimate their age, within a few days, at a minimum. The Forest Officer does not give the necessary detail as to where or under what conditions he saw two pair of tracks on the same day, and how far apart they were; nor in fact, is it clear that he did this tracking himself. I knew from hard experience, just how far it is possible to travel in that particular jungle in a given time, and how very much faster a rhino can do the distance, and to be convinced that he himself saw and measured four tracks in the same day that were indubitably different rhino, much more detail would have to be given than he affords. The Game Ranger's testimony on this point, I cannot, I fear, accept. His alleged ability in deciding whether a track is male or female sounds uncanny, but in practice I did not find it so. In no case either in wallow or elsewhere, and invariably with the Game Ranger,

did I or he see unmistakable evidence of more than three tracks that, we could feel reasonably sure, were different; and that was chiefly due to my measurements. Only once in the whole time and area covered did I see fresh droppings, as fresh as say, perhaps one day old, and then of one animal only, and only in two cases as fresh as possibly a month. I personally can give no opinion except surmise, as the Game Warden did, of two animals, apparently together, being probably male and female, from the relative difference in the width of their footprints, and so we come to the question of breeding. None has any personal evidence on this. I have been told by a member of the Forest Service that reliable evidence exists as to calves being born in 1928 and 1935. All the evidence there is, is as follows, and no immature animal has ever been seen:—

The report of a native villager is given by the Game Warden as in 1928 having seen the tracks of an old rhino and those of a very young one together, sizes of tracks are not given and would doubtless in any case be unreliable. The smaller track was shortly after not seen again, and it was surmised it had gone off on its own, though only a few months old. It was hoped, the report says, that it would soon be rediscovered.

The only further evidence is of a track said by the Game Ranger to have been seen by him several times, measuring about five inches in width. Knowing how this individual measures the width, this track could have easily been 6 inches, the size of a hindfoot of a semi-mature *sumatrensis*. I was given a tale by another member of the Forest Service, before visiting Kahilu, of Karen natives having watched from a machan, two rhinos mating. Recently, however, I have received a copy of a most curious report made by a forester at Kadaingti in July, 1933, and addressed to the S.D.C. Thaton. It is written in English of a sort, but whether this copy is of an original, or is a translation, I cannot say. It states in effect, that he and a villager saw rhino tracks and following them, saw blood on the leaves. He had never seen a rhino in his life before. They followed and heard the animals *roaring*. They climbed up a tree 10 or 15 feet and saw two rhino, one with a horn 'which is about a foot in length just below the eyes,' and the other, the female, 'with a bulging thing on the nose-ridge.' After ten minutes the rhino left, and the forester went away in the opposite direction. He describes the head as '*resembling a pig, and on the whole, the animal resembles an elephant, where the tail looks like a pig.*' Referring to the blood on the leaves, he states 'The blood smells as rhino's blood as used for medicine, but with stronger odour.' Without giving any specific reason in the report he infers that the blood is from the rhino menstruating as the village elders have told him that the rhino have this habit. The story as told, sounds much as a village elder's tale would. I do not know if this is the same forester I saw at Kahilu, but the tale sounds like his that I have quoted before.

In face of all the foregoing the official Game Warden's report for 1936 says: 'The Head Keeper could not substantiate *his*

estimate of eight Rhinoceros (*Rhinoceros sondaicus*) made last year and the number of these exceedingly rare and *valuable* animals is now estimated to be six'. It is reported that these animals used to leave *the Sanctuary*, during the dry season and graze outside Kahilu and as there is no other source of information except from the Head Ranger the above information is obviously entirely from him, though I should not have thought he would have been responsible for the statement of these animals 'grazing'. The only Asiatic rhinoceros that grazes is the Great Indian Rhinoceros. I should like to know how the Game Ranger estimated these eight rhino in the reserve. It must have been at some time after the Forest Officer's visit. How did the number increase so suddenly and most particularly do we wish to know what he believes has happened to the other two? There has obviously been a misunderstanding in the compilation of the report and for 'Sanctuary' should probably be read 'Reserve', as it has never been alleged, to my knowledge, certainly not in previous reports, that the rhino are in the habit of leaving the 'Sanctuary' limits. I understand that the Game Warden's report for 1937 has not been issued, but in the Rangoon Gazette in April, an extract as follows is given:—*'The six Rhinoceros sondaicus were accounted for, again italics mine.'* I should be interested to know whether the definite statement in each report that the rhino is *sondaicus* comes from the reports of the Game Ranger or whether this has been inserted by the Game Warden. Certainly, no Rhinoceroses were seen by the Game Ranger in either 1935 or 1936. Nor have I heard of any further evidence offered in either year, other than I have reviewed in this report. It is official reports, on which public knowledge of the Kahilu rhino is based. It would seem to be most important that sources of any new information should be given in detail. In the Rangoon Gazette of March 12th, was an article on Wild Life Conservation, which after stating that the Kahilu Sanctuary is one of the 'most interesting in the world', goes on to make the surprising assertion that since the foundation of this Sanctuary the stock has increased from 5 to 7 animals and the author states that there are now three males and four females. He further volunteers that the cow only produces a calf once in three years.

The writer of that article has also never been to Kahilu. From what private sources does all this 'information' come? Most of it must be imagination or based on native gossip. As to the period of *gestation* and the average time of production given above, who can tell? The greatest living expert on the subject, who has for years tracked and hunted Rhinoceros, and who has shot both *sondaicus* and *sumatrensis*, believes from his long experience, that the period of following the mother is much nearer *six years*. Be that as it may, theory has little to do with this matter. It is not here a question of periods but of the conditions, under which these few wretched animals exist, that affect their breeding. One has only to have the slightest knowledge of the ecology of the Rhinoceros—the Javan species is by no means the least sensitive of the five known—to realize that the slow rate of

breeding under the best conditions and the extreme sensitiveness of the female to disturbance will, if at all excessive, probably prevent procreation altogether. I think, therefore, from the facts given above, in connection with this very mis-named 'Sanctuary' the chances of rhino breeding there under present conditions are thousands to one against, and I cannot conceive upon what possible grounds the following statement in the Forest Officer's report is based, 'there seems every prospect of the stock of *sondaicus* growing considerably in the next ten or fifteen years.' Five years of that time has already passed and whatever allegations there may have been as to a rhino having been born here ten years ago (in 1928), no one has, to my knowledge, offered evidence to suggest that one has been born since that time. I am quite aware that criticism is useless unless it can also be constructive. I have assumed that if further investigation proves it necessary, steps will be taken to render possible the procreation of these animals and as I contend that their species has not definitely been proved beyond question that is the first object to be undertaken. Having proved that the animals are *sondaicus* as I fervently hope may be done, it is then, useless to ask *how* much can, or will be done by the Government. It is not, unfortunately, a question admitting of bargaining or compromise. The irreducible and minimum reforms necessary must first be recognized as essential, and unless those can in one way or other, be immediately effected, it is a waste of time attempting anything, for if these few pathetic remnants persistently referred to by the writer of one report, as a 'herd', are proved to be of the Javan species and to contain among them a virile male and female, then immediate and drastic steps must be taken to provide the necessary opportunity for breeding. The first step undoubtedly will be to stop all cultivation, whatever in that portion of the Sanctuary *in which, the rhino find it necessary*, or are at all likely to go, and secondly and of equal importance is it that the entrance or passage of any natives or dogs whatever is not merely prohibited, but absolutely *prevented*. These minimum conditions being found impossible to effect or having been effected, are found eventually not to have been successful in their object, then in the interests of science it would be better to effectually secure their pitiful carcasses, for posterity, not as technical exhibits alone, but as monuments to the apathy, ignorance and ineffectiveness of our legislators.