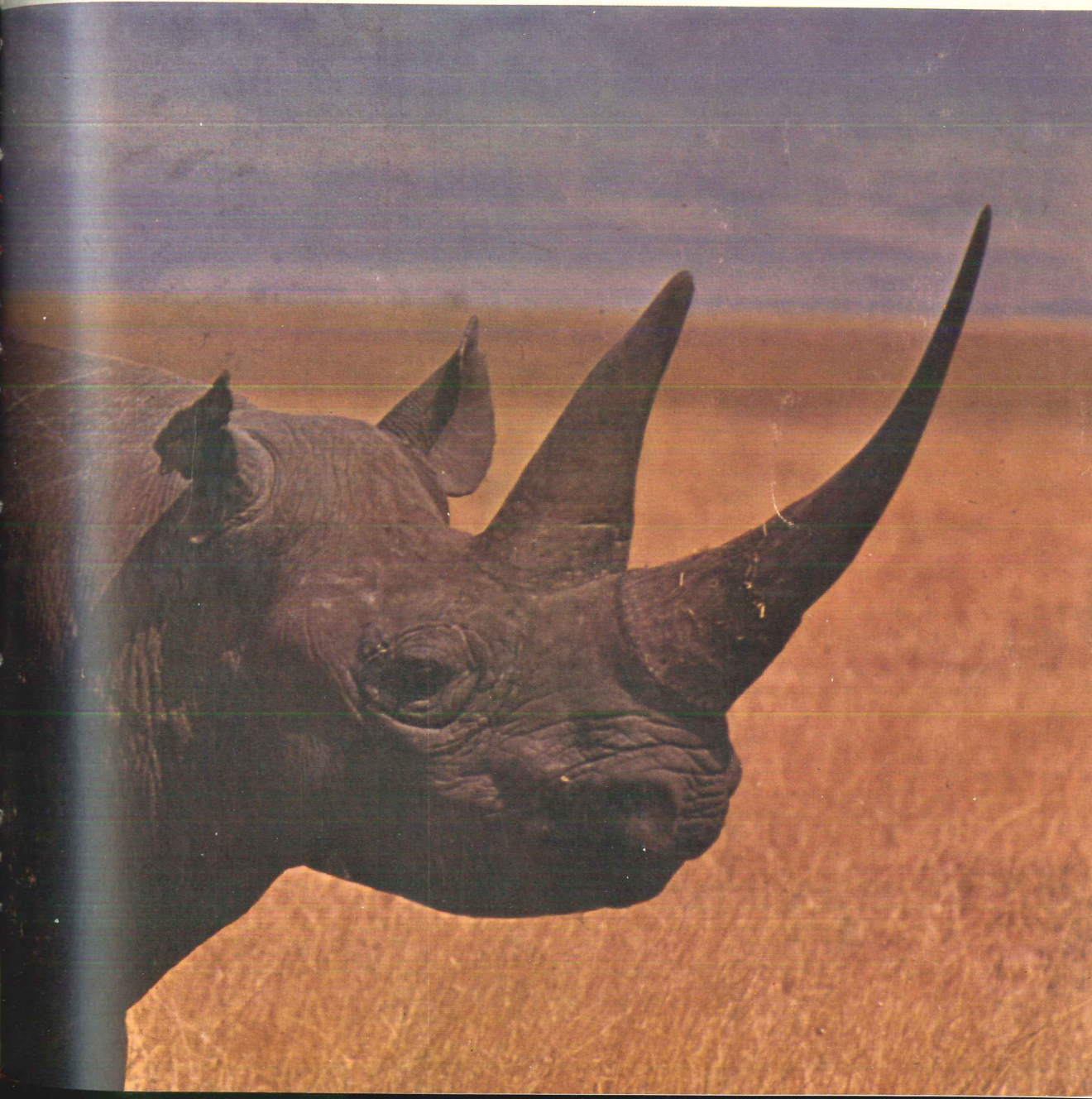


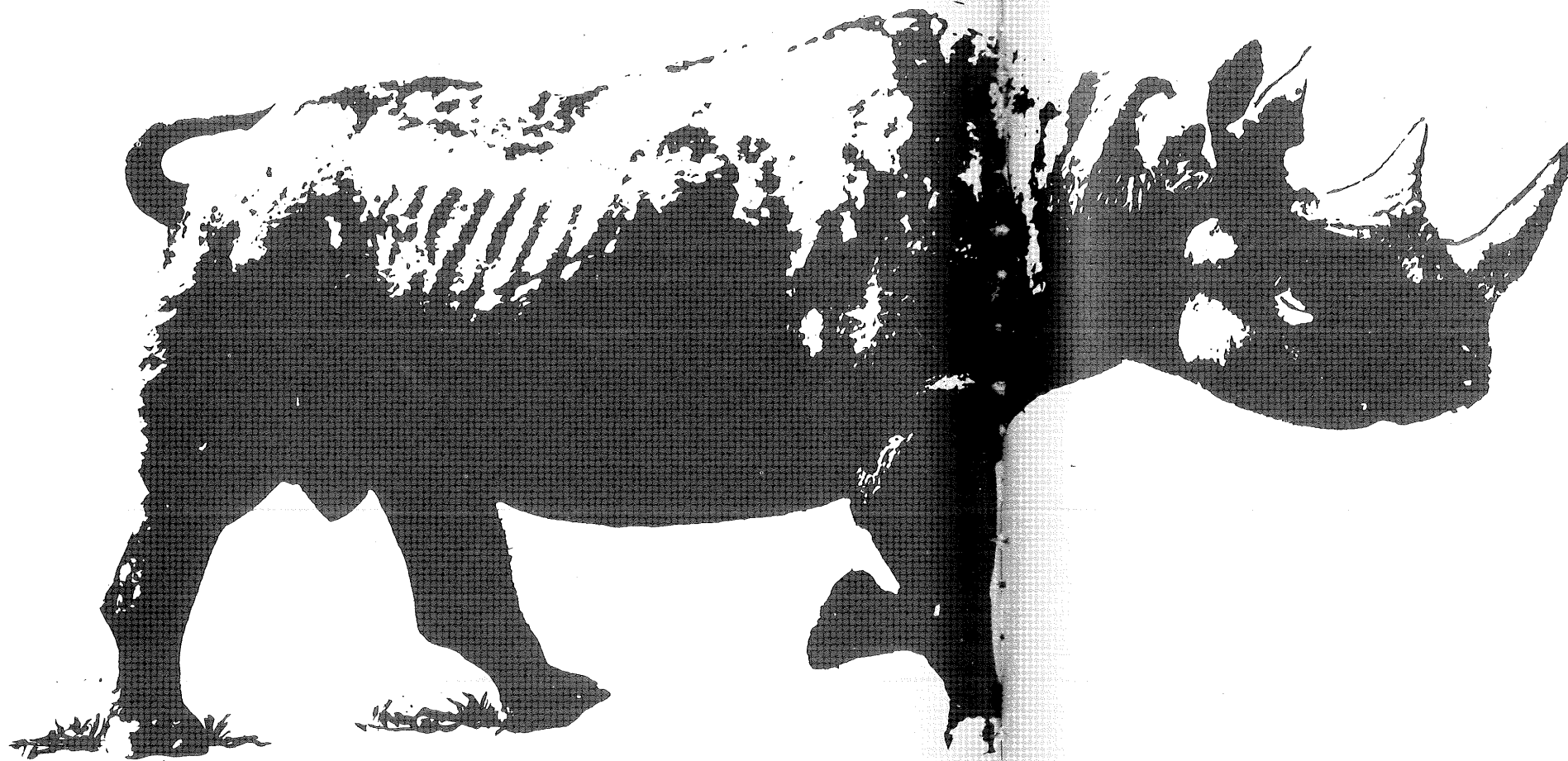
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BLACK RHINO OF TSAVO

by John Goddard

The tiny Super-Cub aircraft roared over the top of the *Terminalia* bushes amid the arid scrub of Tsavo National Park in Kenya. A huge black rhinoceros lumbered out from the bushes and trotted down the edge of a small rocky ravine, following the contour of the slope. Tiny tick birds fluttered around the rhino's head, as it carefully weaved its way through the patches of thorn-bush. The rhinoceros finally came to a stop in the shade of an umbrella acacia, swinging its head quickly from side to side, as though trying to locate the source of the disturbance.

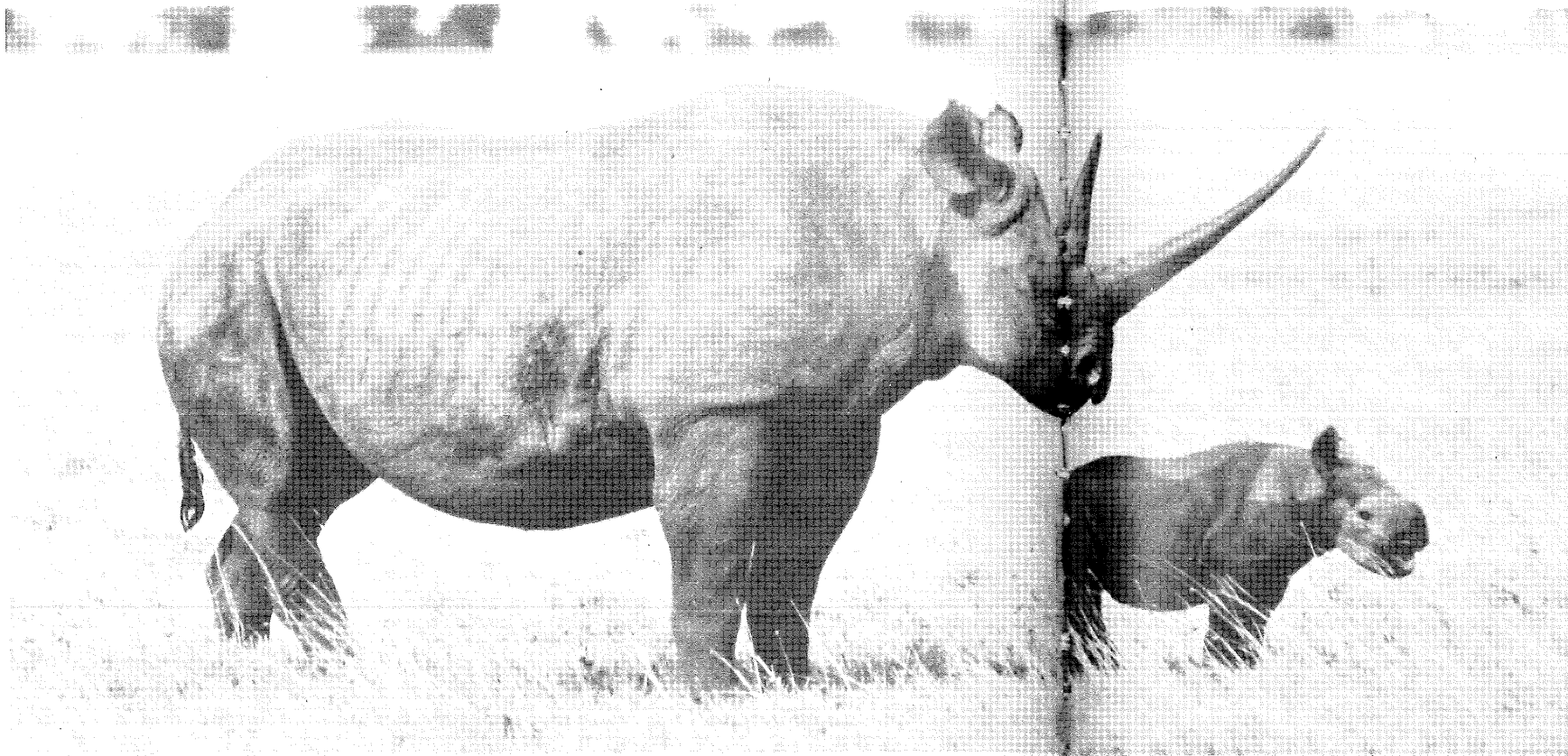
"Any more?" shouted the pilot. "Don't know," I replied, "let's try another pass." Again the tiny airplane roared over the bushes at tree-top level, shot up in a graceful arc, and banked sharply to the left. A puff of dust suddenly appeared from among the bushes. An instant later a female rhinoceros with a small calf, accompanied by an immature rhino, ran out of the thick cover and raced away.

The record and location of the group was

carefully noted, and on we flew. Far away the majestic snowcap of Mount Kilimanjaro glistened in the morning sun. The little plane was now flying adjacent to the Galana River and parallel to the Yatta Plateau, a gigantic lava flow stretching for nearly 180 miles across Kenya.

I tapped the pilot on the shoulder. "Something over there," I shouted above the roar of the aircraft, "dust behind that tall termite hill." The plane banked sharply to the right, and we flew over to the termite hill. Several giraffe and a large group of zebra and oryx bounded away beneath us. A very alert rhinoceros was standing behind the termite hill. Disturbed by the noise of the aircraft, he had gotten up from his dust-bed, thus raising the dust and attracting my attention.

On we flew up the meandering Galana toward its junction with the Tsavo. Several more groups of rhinoceros were observed near the rocky Simba hill, scene of the famous "Man-eaters of Tsavo" episode, immortalized by Colonel Patterson at the beginning of this century. We landed for fuel and mapped our results. Sex, relative age of the rhinoceros, group structure, location, activity,



A female black rhinoceros and young calf were among the individuals studied by the author in Kenya's Tsavo National Park, which probably contains the largest population of black rhino in existence today.

habitat type, and other biological data had been carefully noted for each observation. We had seen 87 rhinoceros in one and a half hours. The percentage of calves of the year in the sample was of considerable interest, as this provided an index of recruitment of young animals to the population.

Tsavo is one of the last strongholds of distribution of the black rhinoceros, and the park probably contains the largest population of this species left in existence. The morning's work described above was part of a census of the species which was conducted in Tsavo during 1967-1968.

The park is undergoing progressive change from what was formerly a thick *Commiphora* woodland to bush grassland and open grassland. The change has been initiated by tremendous destruction of this woodland by a very large population of elephants. In some areas, damage to the woodland has been phenomenal. Thousands of trees and larger bushes have been knocked over and destroyed, and many of the larger trees such as the baobab have been ring-barked and fallen to the ground. With the large amount of dead and decaying woody material and debris present, hot

ground fires have swept through, aided in their spread by the inevitable invasion of the open areas by grasses. These fires in turn tend to kill off or retard new growth of browse. These two factors have changed the whole ecology of the region. The black rhinoceros is essentially a browser; from the point of view of conservation of the species, it was considered very important to determine the probable effect of this habitat change on the species.

Some observers felt that the large scale devastation and damage initiated by the elephants and aggravated by fire have been detrimental to the black rhinoceros; they believed that the rhinoceros were suffering severe competition from the elephant for the remaining food supplies and that the rhinoceros were slowly dying of malnutrition. This anxiety was heightened in the early part of this decade when, during a marked drought, at least 282 rhinoceros died along a 40 mile section of the Athi River in the eastern sector of the park.

A census of the rhinoceros population was thus one of the concerns of research on the species. Large parts of the park were systematically covered in a Super-Cub, and all rhinoceros seen were counted and recorded on a map. Animals

seen were recorded as adults, immatures, females with calves, and females with young of the year. Black rhinoceros are difficult to detect from the air even in open thorn-bush habitat. Not only are they essentially solitary mammals, but their habit of wallowing and resting in dust-depressions provides them with excellent camouflage in their surroundings. Also, the natural dull color of the animal often tends to match perfectly with its surroundings.

In view of this difficulty, correction factors were placed on these counts and crude estimates of the population made. These crude estimates were then checked and refined by ground counts and by intensive searches of very small sample plots from the air. The crude estimates and refined estimates show close agreement and suggest that the population is around 7000.

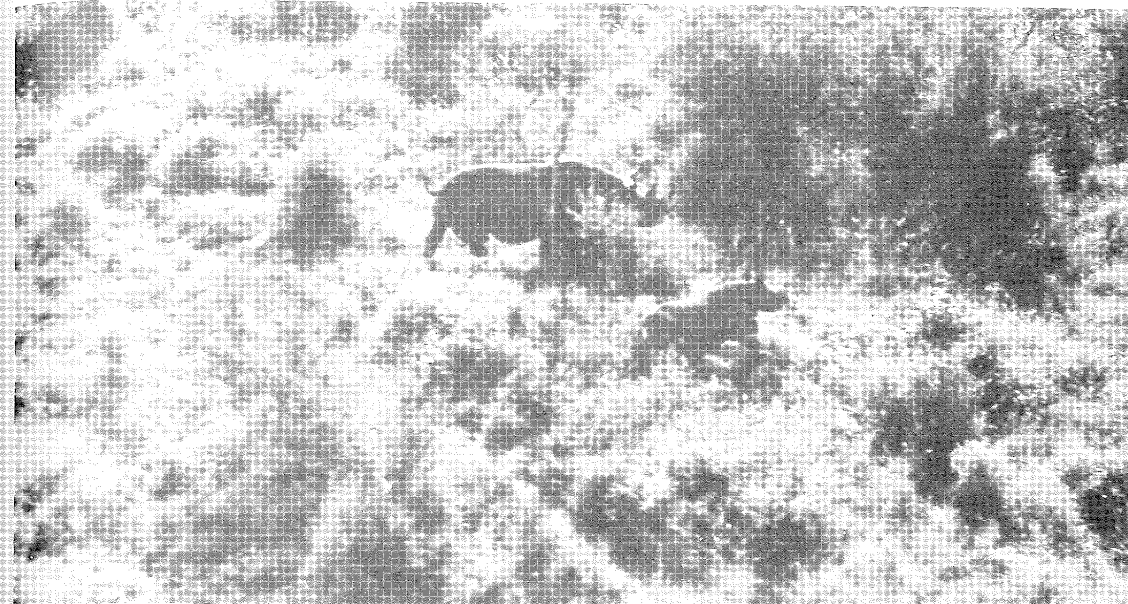
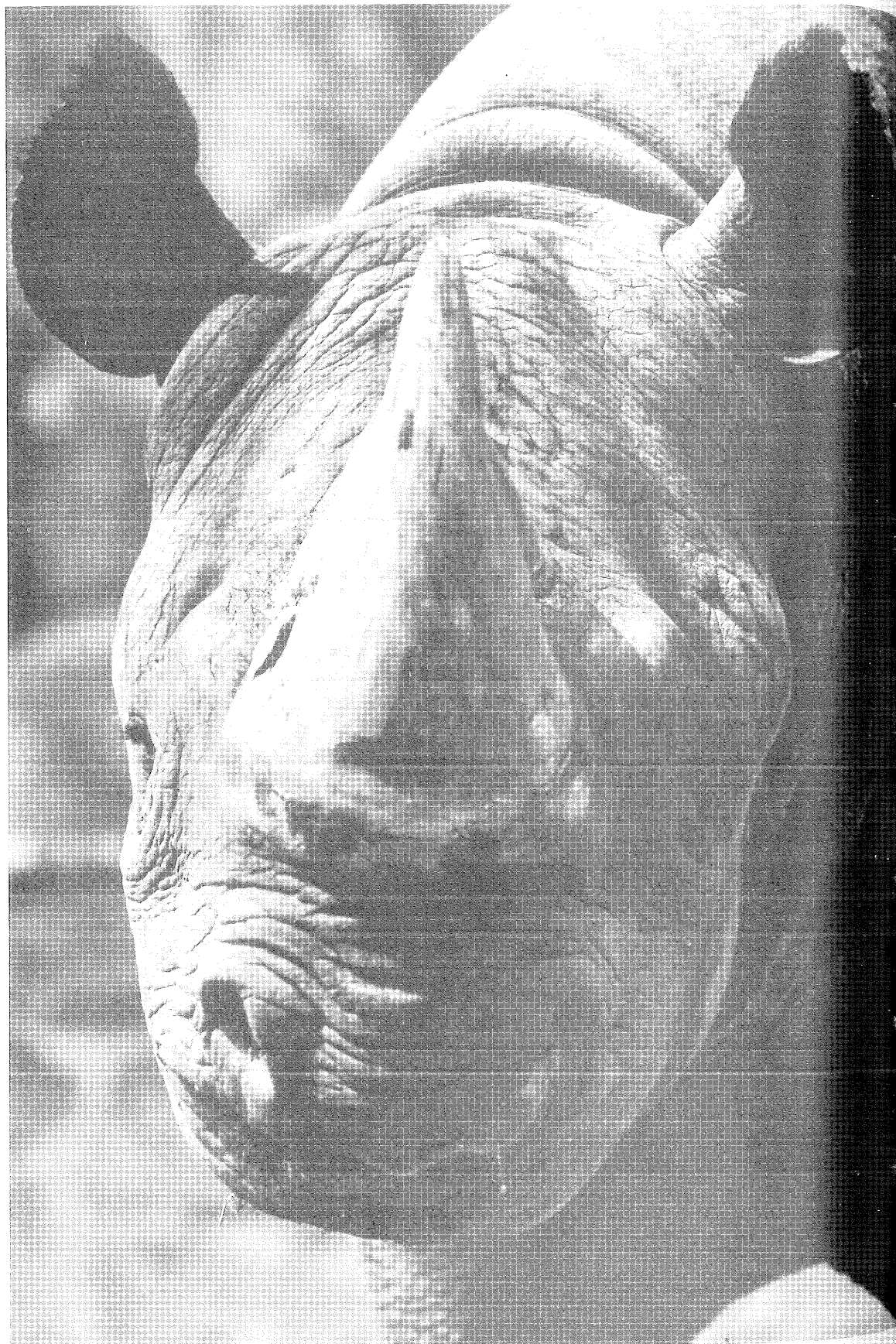
One evening a friend arrived in Tsavo. During the course of our conversation, he asked to accompany me on field observations of the rhinoceros. It so happened that I was going out the following morning to obtain further data for the studies of food preferences of the rhinoceros.

We departed the following morning as the pink streaks of dawn were appearing above the thorn-bush. Driving along a red dusty road we rounded a bend. There, 50 yards ahead of us, was a large bull rhinoceros. He was busily feeding on some *Crotalaria* growing in abundance at the edge of the road and was unaware of our approach. I turned off the engine quickly and examined the animal with my binoculars, pointing out its salient features to my companion: the complete absence of a fringe on top of the right ear, a semi-circular notch on the bottom lobe of the left ear, a posterior horn noticeably pointing forward, a small stub of an anterior horn, a prominent and permanent triangular scar on the central left side of the neck. "When he turns around you will see that half his tail is missing," I whispered to my companion. "It's an old male I've seen many times around here."

Black rhinoceros can readily be identified individually by noting their sex, characteristics of the body and ears, by the size and shape of the horns, and by the pattern of wrinkle contours on the snout. Normally when studying the habits and ecology of a wild animal, it is necessary to tag or to mark individuals so that they may be recognized when seen again at some later date. This is not necessary with the black rhinoceros, as is the case with several other African mammals. Their individual characteristics differ very markedly, and as the animal is sedentary, usually occupying a very small home range, subsequent identification is easy. Identification is essential for home range and movement studies, but can also be very useful in other work, such as age-growth rate studies of calves.

We arrived at the Galana River just as the sun was slowly appearing above the majestic Doum palms on the banks of the river. Several small groups of elephants were feeding near the salt-bush which formed a fringe on the river banks. Slowly we drove down-stream parallel to the river. A large herd of buffalo galloped across the road in front of us. As far as the eye could see, the skeletons of thousands of dead trees could be observed, destroyed by feeding elephants during a severe drought. The dead boles and branches were slowly being covered by invading grasses and shrubs.

I stopped the Land-Rover. Accompanied by a park scout, we proceeded on foot. The sun was higher and already the air was hot. At about 8:00 A.M. the scout stopped abruptly, turned, and said "Kifarua bwana; kule." An instant later we heard the screech of tick birds. I followed the scout's pointing finger with my binoculars and observed a



The black rhino is not really black, but rather dark gray in color; it has a lengthened upper lip which it uses adroitly in plucking leafy branches (left). An aircraft was used to locate the animals, which would run from cover and away from this disturbance (above).

cow rhinoceros with very long horns, accompanied by a tiny calf. The cow was feeding actively, and every time she stopped to feed, the calf attempted to suckle.

"There's a cow over there with a new-born calf," I whispered to my companion. "We'll go over and watch her feeding." The scout tested the wind and motioned me to follow him. Slowly we approached. Making use of the sparse cover, we stalked to within 35 yards of the rhinoceros. Fortunately she was walking directly into the wind, and the tick birds had left her. These birds often accompany a rhinoceros, and when something unusual approaches, the birds often screech and fly up with loud chirps; the rhinoceros is immediately on the alert. When the rhino is unaccompanied by these birds, it is possible to get very close to it as the rhinoceros is quite short-sighted.

Very slowly we followed behind the cow; note was made of the plants she was eating. The freshly-browsed tips of the plants were very apparent. I pointed to the green specimens of *Indigofera spinosa*, with their neatly clipped terminal shoots. "You can see that she's eating a lot of these ground herbs," I said to my companion. "This is another palatable food," I said, pointing to a freshly clipped *Caesalpinia*, a small bush with beautiful pink flowers which superficially resembles a small acacia. The rhinoceros had carefully



Elephants and rhinoceros meet near a water-hole.

The black rhinoceros is essentially a browser, competition with elephants for browse during periods of drought would be detrimental to the rhinoceros population.



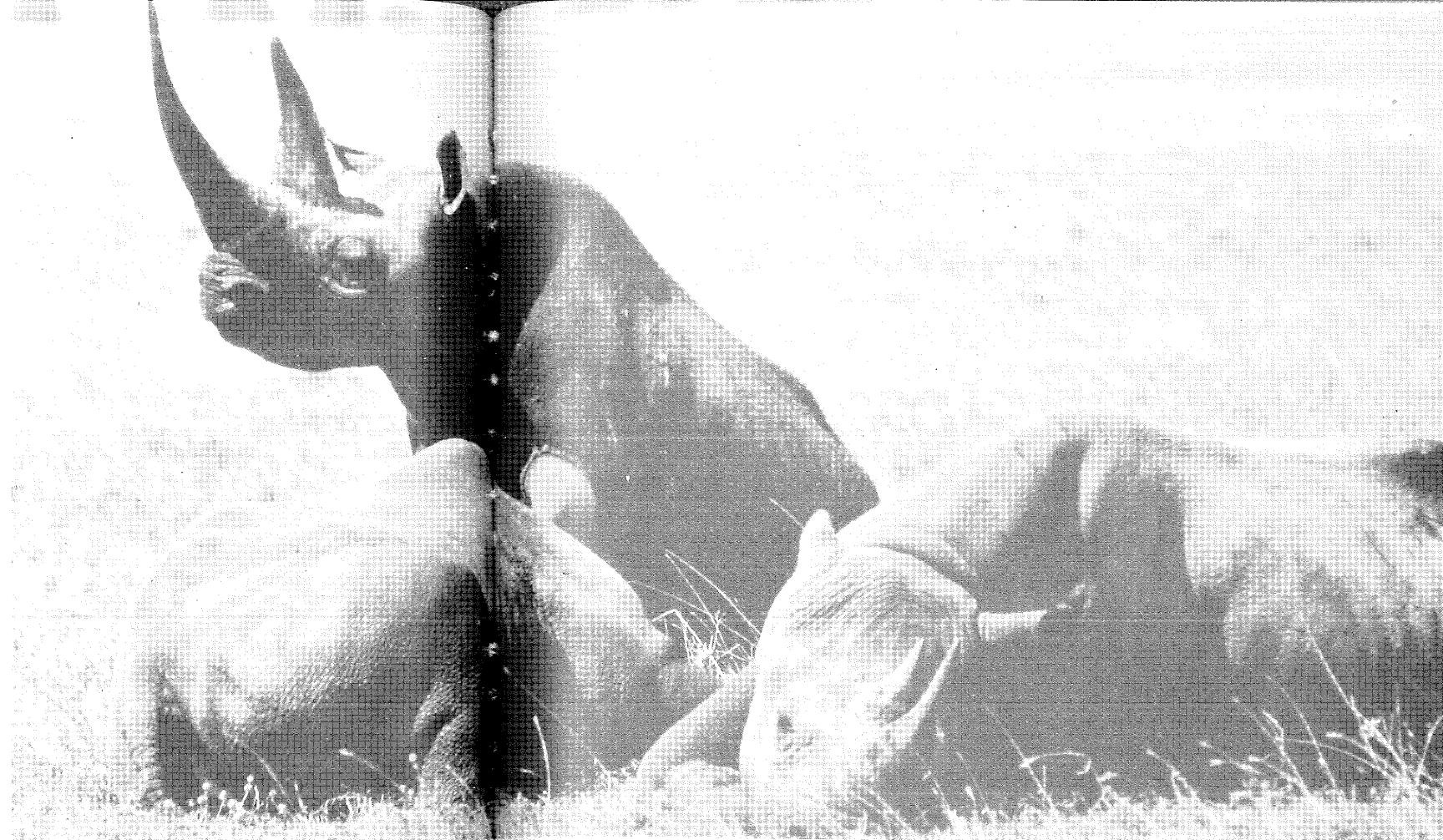
selected the terminal parts of the bush, leaving a straight clean cut, as though snipped with a pair of shears. We examined, noted, and recorded on a check sheet the floral composition and habitat type through which the animal was feeding. It was important to determine the plants which were available to the feeding rhinoceros, in addition to the plants which she actually selected, the latter in order to establish food preferences.

I carefully checked my catalogued records. I had seen this cow three weeks before; at that time she had been accompanied by a very large female calf. Now she had a tiny male calf, born sometime in the interim period. I was very pleased, as the age of this calf was known with some precision, and his growth and development subsequently could be studied. The female rhino may calf every year-and-a-half to three-and-a-half years in the wild. At times the interval is even longer.

The cow was now some distance away standing alongside a termite hill. The calf was butting her udder with his head. A moment later she nudged him away with her hind leg and sat down in the dust-depression adjacent to the termite hill.

On the way back to the Land-Rover, the scout pointed to a white object about 150 yards from the trail. I glanced at it with my binoculars and saw it was a bleached rhinoceros skull lying in the sun. We retrieved the skull and the lower jaw and returned to the Land-Rover. Arriving back at

Tick birds accompanying a black rhino function as a warning system for the weak-sighted mammal.



The two stout horns of the black rhino are formed from closely-packed fibers, sometimes called hair, and have no connection with the bone of the skull.

headquarters I placed the skull with the others in the collection outside the laboratory.

My friend was fascinated by the large collection of skulls which numbered over 500. The approximate age of a rhinoceros can be determined by examining the characteristics of its dentition. Age studies can be very useful in determining the status of a wild animal population; an increasing healthy population usually contains a high percentage of young animals, whereas a decreasing population usually contains a high percentage of old animals. A stable population shows a more even distribution of age classes, and the birth rate equals the death rate.

The collection of skulls had been divided into several age groups. This made it possible to determine the proportional mortality occurring in each class. These studies, together with studies of the age structure of the living population, provided a useful method of ascertaining the status of the population.

The black rhinoceros, like the other four living

species in the rhinoceros family, has long been believed to be in danger of extinction. In recent years, considerable concern has been shown by the governments of Kenya and other African nations and by international zoological organizations, which have speculated on the fate of the black rhinoceros throughout its entire range in Africa. There is no doubt that the species is extremely vulnerable to poaching, and the value placed on its horn makes it an attractive target to poachers. It is also unable to adapt to invasion of its habitats by agricultural settlement and other forms of development. In addition, it is very sedentary and shows no tendency to disperse into new habitats. The species is also late in maturing and possesses a low reproductive potential.

It is believed that around 1850 the black rhinoceros occurred in approximately one-third of the land area of Africa south of the Sahara. Its distribution today shows that its range has been reduced considerably, but that it still occupies a substantial part of its former range. It is only very



The black rhino, capable of short burst of speed up to 25 miles an hour in a lumbering, earth-shaking gait, is an unpredictable animal but is more inclined to run away than to charge a man.

recently that scientific studies of the species have been initiated in various parts of Africa. In East Africa these studies have shown that in some areas the species is far more numerous than was formerly believed. This is not considered as evidence that the species is increasing, but merely reflects more accurate and scientific methods of appraising populations.

In many African countries, the black rhinoceros is strictly protected by conservation agencies, and in several parks its future seems assured. Modern methods of immobilization with drugs and subsequent translocation of these large mammals is now an entirely feasible management procedure. The value of the animal stems largely from its great tourist attraction, possibly because of its relative

rarity and reputed pugnacity.

As mentioned earlier, Tsavo probably contains the largest population of black rhinoceros left in existence, and it is essential to determine if the species will survive in the changing environment. The current study suggests that at the present time the population is stable and relatively large. Recruitment of young animals to the population appears normal. Their future survival in the park will probably depend mainly on how the habitat change progresses and in what direction.

Recent ecological studies of elephant populations in East Africa have shown that in several areas these populations are declining. It has been suggested that these declines are related to habitat modification, taking the form of large scale destruction of woodland by over-populations of elephants. These changes are induced by the elephants themselves and are aggravated by fire; in general the combined effect is to convert woodland to grassland.

Several food habit studies conducted in East Africa show that a large proportion of the diet of the elephant is grass. However, recent research into elephant ecology suggests that healthy populations of elephants can only be supported in areas with extensive browse; moreover some scientists believe that the observed declines are related to the destruction of woodland, leading to a dependence on a diet made up almost exclusively of grass.

Browse is apparently an important requirement of elephants during dry periods. In Tsavo, heavy feeding and large scale destruction of woodland is very marked during periods of drought, as more browse is consumed by the elephants when the grasses reach the quality of a poor standing hay or wither completely. Over a series of droughts this could lead to severe food competition, to the detriment of the rhinoceros, and may ultimately lead to a reduction in the carrying capacity of the park for the species. The situation is aggravated by the low rainfall and by the fact that the elephants tend to concentrate along the permanent rivers during periods of drought; these are the areas where the high densities of rhinoceros are still located.

The current habitat change has not been entirely detrimental. With the environment developing toward grassland, the population of "plains game" has increased markedly. Species such as zebra, buffalo, and oryx have noticeably increased; this increase in prey species will probably result in an increase in the predators which prey on them, providing a greater variety of fauna. However, in the absence of emigration of the elephants, it will

probably be necessary to reduce their numbers in order to stabilize the ecosystem. Research has indicated that there are several separate elephant populations in Tsavo, and at least one is probably in the preliminary phase of a decline. As a safety precaution, and however regrettable, it will probably have to be the task of man to hasten artificially the decline through reduction of the herds, and thus stabilize the environment and encourage early regeneration of the woodland.

This young male rhino stands in an area which was formerly thick woodland. The change in habitat is one of the factors involved in the study of the black rhinos of Tsavo.

