

tundra and steppes, the Green woodpecker must have taken refuge in the South-east, South and South-west parts of Europe and lived there isolated for a very long time. In post-glacial times it may have recovered, following the forest-border, West-, North- and East-Europe from two directions: from the South-east (long-winged or short-winged birds?) and the South-west (short-winged birds) and on this occasion or afterwards (in case the long wing of *Picus v. viridis* L. has come into being in post glacial time) there may have arisen a large area, inhabited by a hybrid population.

The Endemic Sparrow Hawks of Celebes

(with Plates 1-2; Figures 1-2).

BY

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1. Introduction.

In spite of the fact that the Island of Celebes is situated since its origin on the labile borders of two regularly moving continents (Asia and Australia), which now touch each other in the Sunda Plat and the Sahul Plat, and although this island came into contact more than once with the faunae of both continents, still the presence of a large number of endemic species is a conspicuous character of its fauna. The peculiar geographic situation, the complication of its zoogeographical relations, and the attraction, caused by its endemic forms on scientists of all countries, have stimulated the interest in the island since many years. Therefore it is both remarkable and typical for the abundance of Celebes forms, that after the description of several ornithological collections, which were usually enlarged by the material, obtained through Heinrich's activity (1930-31) on many parts of the often hardly accessible island, the study of the birds collected by Mr. L. Coomans de Ruiter, in the northern province of Minahasa (1939-40), has contributed much to the increase of systematical knowledge of the bird fauna of Celebes (cf. Van Marle, 1940). Not less than three endemic Sparrow Hawks and one endemic Goshawk are known from Celebes, all belonging to the genus *Accipiter*, viz. *A. trinotatus* Bonaparte, *A. rhodogaster* (Schlegel), *A. nanus* (Blasius), *A. griseiceps* (Schlegel). *Accipiter nanus* is a very rare bird in collections, whereas the three other forms have always been collected in Celebes in fairly large numbers. After 8 specimens had come to our knowledge, Mr. Coomans de Ruiter collected 2 adult ♀♀, and one ♀ in juvenile dress. The description of the juvenile plumage of *A. nanus*, which was up to this time unknown, forms one of the objects of this paper. Some remarks on a not yet described variety of the juvenile plumage of *A. trinotatus* will be added. Finally the

study of the Celebesian species of *Accipiter* in general—especially that of their juvenile plumages — has led to some theoretical remarks.

Apart from the systematic and geographic notes, details on biology and food are given at the end of the article. These are taken mainly from the labels on the collected specimens, on which stomach contents and other notes are to be found, originating from examinations by Mr. Coomans de Ruiter.

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2. The Juvenile Plumage of *Accipiter nanus* (Blasius) (Plate 1).

Volcano Sopoetan (Minahasa): ♀, 19.V.1939, 1500 m altitude.

Upper surface: Head: blackish brown, feathers with inconspicuous narrow chestnut margins, base white; neck; as on the head but mottled with white; back: smooth chestnut red as in *A. trinotatus*; tailcoverts: chestnut with black bars; wing; coverts; chestnut with dark brown central spots; secondaries; outer webs chestnut, inner webs white barred black, tip chestnut; innermost secondaries: bars reduced to spots; primaries: outer webs chestnut; inner webs blackish brown barred black.

Under surface: throat, breast, abdomen, under tail coverts: creamy white, on breast and flanks streaked black; tail: pinkish brown barred black, the outermost pair has 8, the central ones have only 4 cross bars of 12 mm each; only 3 bars are visible from above; wing: primaries: distal part dark grey with darker bars, outer webs chestnut, proximal part of inner webs pinkish brown with dark brown bars.

Soft parts: naked skin around the eye: yellow green; bill black, cere yellow green; feet light yellow, nails black; iris yellow green (light yellow, and orange yellow in 2 adult ♀♀).

Measurements: wing 168, tail 119, tarsus 48, middle toe without claw 28, culmen 12.5 mm.

Apart from the dark head and the barred brown tail this bird resembles very much the juvenile *A. trinotatus*. Remarkable, however, is the great difference between *A. nanus* and *A. rhodogaster*, which in their adult plumages are so much alike.

3. Dimorphism in the Juvenile Plumage of *Accipiter trinotatus* Bonaparte (Plate 2).

The juvenile plumage of *A. trinotatus* has been described more than once in the ornithological literature. Blasius (1897) draws much attention to moulting young birds, in which he thought to have found that the tail feathers change their brown colour into black without being moulted!

From the specimens examined it appears that the colour of the iris in juvenile *trinotatus* is very variable. The labels mention: light pearl grey, grey, light brown red, grey brown, brown, dark brown, whereas adult birds have the iris red brown to dark brown.

Nowhere a description could be found of a plumage differing from the ordinary one, which we found in 7 of 23 juvenile birds examined (12 specimens coll. Van Marle—Coomans de Ruiter; 10 specimens coll. Museum of Natural History Leiden, 1 specimen Zoological Museum Amsterdam):

♀ Koemersot (district Tonsea) 15.VII.1939 (Coomans de Ruiter)

♀ Roeroekan (" Tomohon) 2.VIII.1939 " "

♀ Tanahwangko 22.IX.1939 " "

♂ " 9.X.1939 " "

sex? Gorontalo 1841/42 (Forsten)



sex? Minahasa 1878 (Van Musschenbroek)

♀ Kikeira (distr. Koelawi) 23.II.1918 (Kaudern)

These birds differ from the other young birds in having the head darker, the feathers having larger black centres and narrower red brown edges, besides being on the mantle, scapulars, back, wing- and tail-coverts darker brown, giving the upper parts a darker and rather spotted appearance, obviously differing from the unspotted chestnut red upper parts of the other birds. From the fact that both some unspotted and spotted birds examined have moulted their juvenile tail feathers into adult ones, we come to the conclusion that the spotted plumage probably cannot be the intermediate stage between the juvenile and the adult plumage. Thus, the spotted plumage is to be regarded as an individual variety of the juvenile plumage.

4. On the affinities of *Accipiter trinitatus*, *rhodogaster* and *nanus*.

Stresemann (1923) has tried to give one of the three Celebes Sparrow Hawks a place within the „Rassenkreis“ of an eastern Asiatic and Indomalayan species (eventually also habiting a part of the Indoaustralian region). Rensch (1931) and Peters (1931) have followed him in considering *rhodogaster* to be a subspecies of the species *A. virgatus* (Temminck), which includes a number of small Sparrow Hawks, all possessing long tarsi, and exceptional long and slender toes (especially middle toe!). We cannot agree with this opinion, for which we propose to substitute another. Stresemann too has changed his view (1936) since the rediscovery of *A. nanus* has shown that two Sparrow Hawks with long tarsi and long toes live in Celebes, this making a specific union founded on geographical representation of one of these Hawks (either *rhodogaster* or *nanus*) with races of *A. virgatus* from Java Borneo, and the Philippines a mere question of personal appreciation. Besides this, the juvenile plumages in *rhodogaster* and *nanus* are so much different from these of the races of *virgatus*, that Ripley (1941) appears to be perfectly right in suggesting that „it seems questionable to include *rhodogaster* in the species *virgatus*“ (p. 345).

A. trinitatus differs obviously from all other species of *Accipiter* by the combination of a very long tarsus and short toes. (reptile hunter; fig. 1,1). Closely allied species are not known.

A comparison of the adult plumage of the three Celebes Sparrow Hawks shows a striking resemblance. Blasius (1897) mentioned the only known specimen of *nanus*, collected by Platen near Roeroekan, to be a possibly dark variety of *A. trinitatus*: *Erythrospizias trinitatus nanus* nov. subsp. s. var. (p. 292). However, he adds to his description: „Habe ich doch selbst das vorliegende Stück anfangs längere Zeit zu *Accipiter rhodogaster* gestellt“ On the other hand Stresemann (1932) confesses that he noticed the difference of *A. nanus* only after a renewed examination of the series of *rhodogaster*, collected by Heinrich. Originally Stresemann described this rare bird as a new species under the name *A. archboldi* (1932; cf. 1938). The striking resemblance of the adult plumages of the three Celebes Sparrow Hawks would seem to be clearly illustrated.

The leaden blue upper parts and vinous red under parts are characteristic of males and females of the three Celebes Sparrow Hawks. Apart from the typical sexual differences in size, no other secondary sexual characters are known. *A. trinitatus* shows three or four large white patches on the inner webs of the tail feathers and can therefore probably be recognised in the field. Differences in the relative lengths of tarsi and toes may be correlated with differences in

food and way of hunting. Lead blue upper parts and vinous red under parts are also found in other Malayan Sparrow Hawks, viz. the males of *A. v. virgatus* (Temminck) from Sumatra, Borneo, and Java and *A. v. confusus* Hartert from the Philippines. In most cases these birds show remnants of dark barring on the under parts, which is typical for Sparrow Hawks. Undoubtedly the striking resemblance of the adult plumages of *rhodogaster*, *virgatus* ♂, and *confusus* ♂ have contributed much to the specific uniting of these forms. The remarkable difference between male and female in the adult plumage in *virgatus* and *confusus*, which in the whole group of *virgatus* gives to the sexes such a strikingly different appearance, is totally unknown in the Sparrow Hawks of Celebes. This characteristic difference between Celebes Sparrow Hawks and surrounding forms, appears to us to be a well founded argument for not uniting them into one species with birds of the neighbouring islands. This conclusion leads to the opinion that the Sparrow Hawks of Celebes belong to the autochthone fauna of unknown origin, which develops in its own way.

Quite contrary to the remarkable resemblance of the adult plumage of the Celebes Sparrow Hawks there is a great difference in their respective juvenile plumages (Plate 2). Not one of these plumages is comparable with the juvenile dress of the races of *A. virgatus*. In this respect too, Celebes Sparrow Hawks stand quite apart. The diversity in the juvenile plumage, in which possibly more original characters have been retained than in the adult plumage, leads to the conclusion that notwithstanding their phenotypical similarity in the adult plumage, *trinotatus*, *rhodogaster* and *nanus* are actually separated by great genotypical differences. The small subspecific differences of the two races of *A. trinotatus* are according to Stresemann (1940) only to be found in the

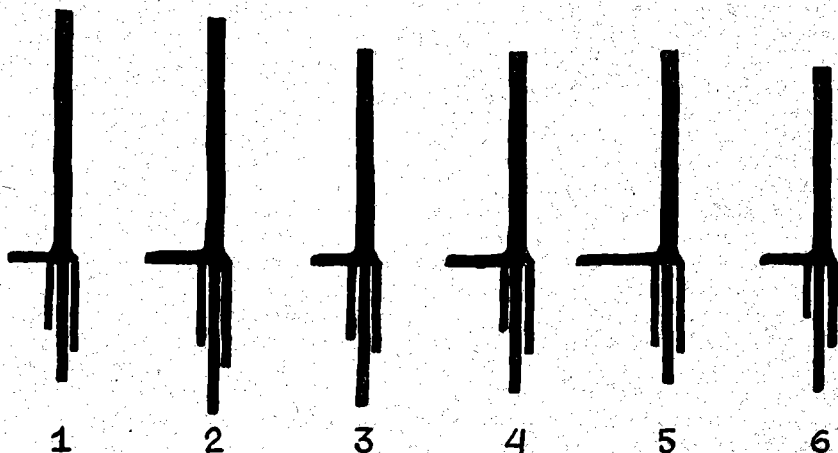
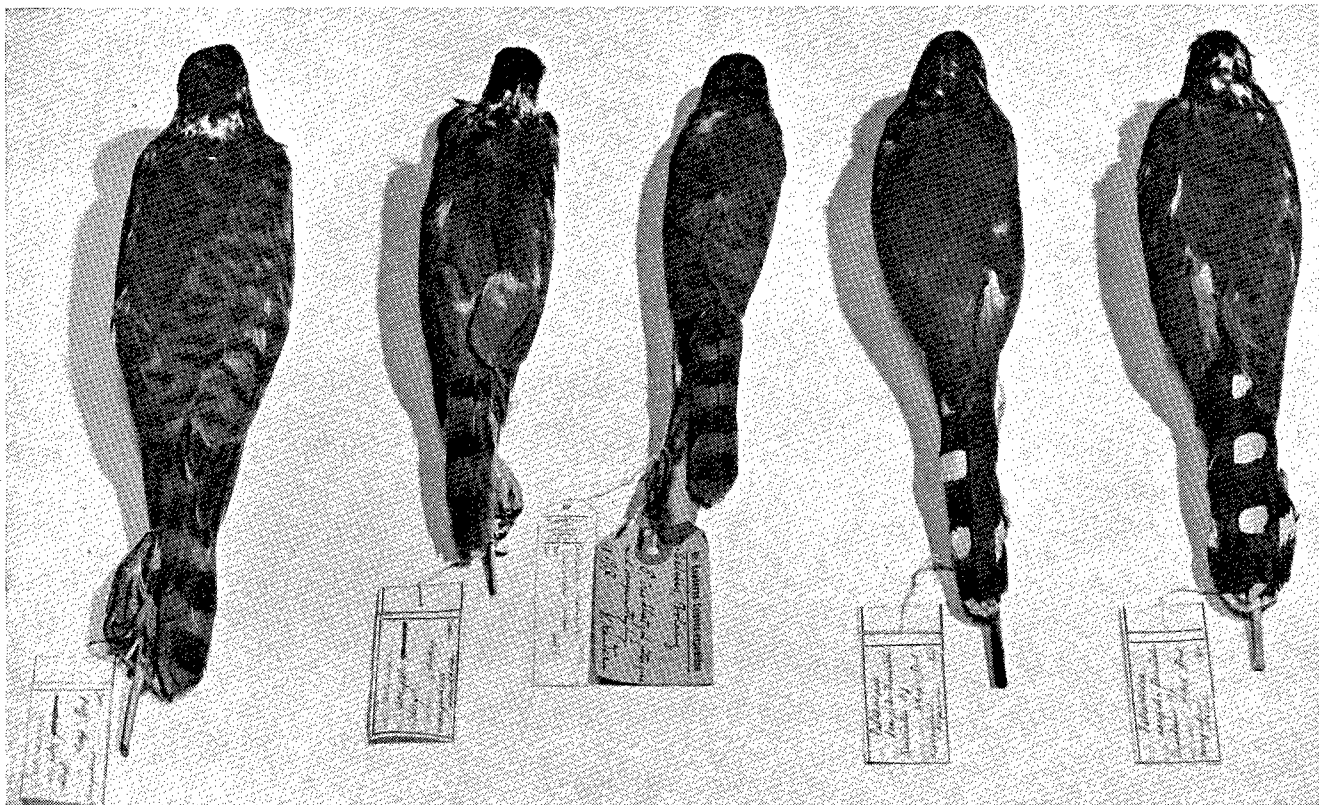


Figure 1. Diagram of relative lengths of tarsus and toes in some species of *Accipiter*. The lengths are reduced to one comparative scale, to which the length of the wing served as a unit. Owing to the relative shortness of the wings in *A. griseiceps* (4) and *A. trivirgatus* (5), the given lengths of their respective tarsi and toes are too long in relation with the other diagrams. They must be reduced to about 4/5 of their lengths. Every diagram is made from the measurements of one adult female. 1. *trinotatus* (Minahasa); 2. *rhodogaster* (Minahasa); 3. *nanus* (Minahasa); 4. *griseiceps* (Minahasa); 5. *trivirgatus* (Sumatra); 6. *nisus* (Netherlands).



The juvenile plumage of Celebes Sparrow Hawks. From left to right.

1. *A. rhodogaster* ♀. 2. *A. nanus* ♀. 3. *A. rhodogaster* ♂. 4. *A. trinotatus*; plumage smooth. 5. *A. trinotatus*; plumage spotted.

N.B. I. The intermediate character of the juvenile plumage of *nanus*, compared with *rhodogaster* and *trinotatus* is apparent

II. The important sexual difference of size in *rhodogaster* is apparent.

III. The colour of the upper parts in all figured birds is mainly rufous.

juvenile dress. No differences seem to exist between the adult plumages of *A. t. trinotatus* (Northern Celebes) and *A. t. haesitandus* (Hartert of Southern Celebes (Bonthain); the same variability of the general colour of the under parts being described in both races. One adult ♀ of *haesitandus* from Pare Pare (coll. Zool. Museum Amsterdam, no. 2087) could not be distinguished from a series of adult birds from the Minahasa (cf. also Riley, 1925). Finally the above-mentioned dimorphism in the young birds of *trinotatus* as compared with the similarity in the adult plumages shows, that the external transformation of the species is influenced in one and the same way. This transformation, which has led to the genesis of quite similar adult plumages in three different kinds of *Accipiter*, is one of the characteristics of the — still inconceivable — influence of island isolation. Therefore we cannot agree with Stresemann (1932, p. 356) that *A. rhodogaster* and *A. nanus* should be united into one "Artenpaar", of which it is supposed, that the separation into two species from the same stock is of a very old date.

Quite contrary to this we suppose to be able to recognise in the similarity of the adult plumages of *rhodogaster* and *nanus* the result of a convergent action on originally polymorphic ancient avifaunistic elements, caused both by the peculiar Celebesian isolation and characteristic climatic conditions. The more pronounced differences are retained mainly in the juvenile plumages. Also the conspicuous sexual difference in size in *rhodogaster*, which is much less pronounced in *nanus*, indicates the specific independence of both these forms:

rhodogaster: wing ♂ 162—172; ♀ 201—209 (Stresemann)

nanus : „ ♂ 151—161; ♀ 164—182 „

Both *rhodogaster* and *nanus* possess a relatively long middle toe, yet *rhodogaster* has a relatively much longer tarsus (fig. 1, 2 and 3).

Concluding we suppose *trinotatus*, *rhodogaster* and *nanus* to be three equivalent endemic species of the same genus.

5. On the Affinity of *Accipiter griseiceps* and *trivirgatus*.

The resemblance of the juvenile plumages of *A. griseiceps* (Schlegel) and *A. trivirgatus* (Temminck) (Southeast Asia) should also be treated in the same way. *A. griseiceps* and *trivirgatus* belong to a section within the genus *Accipiter* which has been separated by older authors under the name *Astur* (Goshawk). This genus has been opposed to the great genus *Accipiter* (Sparrow Hawk), their characteristics being the possession of a short strong tarsus, a relatively short middle toe, a much stronger hind toe (fig. 1, 4 and 5), and a shorter and more rounded wing. No taxonomic differences are to be found between *griseiceps* and *trivirgatus* (*griseiceps* too has a small crest!). So much their juvenile plumages resemble each other, that a juvenile *trivirgatus* from the Philippines (Mindano, coll. Platen, ♂, wing 187 mm) could be distinguished from a juvenile *griseiceps* (Manado, Northern Celebes, coll. Van Musschenbroek, ♀ wing 204 mm) only after careful serial comparison. The small measurements of Philippine *trivirgatus* (♂ ad. wing 192; ♀ ad. wing 206 mm) compared with continental birds, which up to now seems to have escaped the attention of the ornithologists, annihilate the difference in size with *griseiceps* (5 ♂ wing 171—180; 9 ♀ wing 185—204 mm). The determination of young birds without reliable record of locality seems to be practically impossible. The only record of *trivirgatus* in Celebes, on which the inclusion in the avifaunal list by Meyer and Wigglesworth (1898) is based, concerns a young bird, collected during the voyage of the „Marchesa” in 1883 in the Minahasa (Likoepong), Northern Celebes (Guillemand, 1885, p. 545). No real evidence exists that this bird was not a young bird of

griseiceps. Therefore it is quite appreciable that Stresemann too, does not include *A. trivirgatus* in his "Nominal list of the birds of Celebes" (1936). Notwithstanding the fact that the adult plumages of *A. griseiceps* and *A. trivirgatus* are quite different, the resemblance of their juvenile plumages, which may be almost called a similarity, added to the distributional representation of the two forms, seem to make the specific uniting of *griseiceps* with *trivirgatus* almost necessary.

Not before 1945, more than a year after our conclusion of this paper, which has been prepared during the times of war and occupation, the Philippine *trivirgatus* has been described by Mayr (1945) as a separate race (*extimus*). Mayr compared these birds with the Malayan race *trivirgatus*. Historically and genetically they can best be compared with the continental form *indicus* from which *extimus* probably has arisen. *A. trivirgatus extimus* has the lighter coloration of *indicus* and the smaller measurements of *trivirgatus* (wing ♂ ad. 182—188; ♀ ad. 208 mm; Mayr, 1945).

Accipiter trivirgatus may be divided into four subspecies as follows.

A. t. indicus (Hodgson) — Eastern Himalayas, Yunnan, Assam, Farther India, Formosa.

A. t. trivirgatus (Temminck) — Sumatra, Borneo, Java, Southern peninsular India, Ceylon.

A. t. extimus (Mayr) — Philippines (Negros, Samar, Leyte, Mindanao).

A. t. griseiceps (Schlegel) — Celebes.

Some systematists, however, will disagree with our suggestion of uniting *trivirgatus* and *griseiceps* into one species. They will treat them probably as a super-species, without expressing in nomenclature their close relationship.

6. Biological Notes.

The field notes originate from observations made by Mr. L. Coomans de Ruiter, mainly during his service as a government officer in the Minahasa, Northern Celebes. Additional observations were made during the time that he was interned by the Japanese in a camp in a valley near Bolokan, Quarles Mountains, central Southern Celebes, from May till August, 26, 1945. The camp was situated near the border of the small river Bolong, within a wooded area, and lies at about 1300 m altitude. The heavy rainfall, together with highly insufficient feeding, led to the death of many interned Europeans ("Valley of Death", or "Valley of Tears").

Accipiter trinotatus trinotatus.

Coomans de Ruiter collected 11 adult birds and 12 juvenile ones in the coastal forests up to the high mountain forests: in the dark mangrove forests of Tanahwangko, as well as in the forests on the Mahawoe Mountains (collected up to 1360 m) and those of the Goenoeng Sopoetan (up to 1500 m).

"Ein echter Urwaldvogel, den man kaum jemals ausserhalb den düsteren Urwäldern zu Gesicht bekommt" (Heinrich, vide Stresemann, 1940, p. 485). The very long tarsi and the short toes (fig. 1, 1) characterize *A. trinotatus* as mainly preying on reptiles and amphibians. Heinrich mentions as food: in most cases lizards, sometimes grasshoppers, 1 x snail, 1 x frog, 1 x bats. Coomans de Ruiter recorded 9 x lizards, 5 x small snails, 2 x frog, 1 x small bird.

Accipiter rhodogaster rhodogaster.

Coomans de Ruiter collected only 3 specimens in the coastal forests

(mangrove of Tanahwangko, Likoepang) and in the mountain forests (Roeroekan, ± 1000 m). Sufficient feeding records are wanting: Heinrich does not mention anything; Coomans de Ruiter recorded 1 x lizard, 1 x insects.

Accipiter nanus.

Coomans de Ruiter collected 3 specimens in the mountain forests of the volcano-complex Sopoetan (viz. 900—1500 m) and in the forests of the Mahawoe Mountains near Roeroekan (1500 M). According to Heinrich *A. nanus* appears to be a pronounced forest bird of the high mountain zone (1000—2000 m). Feeding records are not given by Heinrich; Coomans de Ruiter recorded 3 x insects, always containing grasshoppers, 1 x small snail.

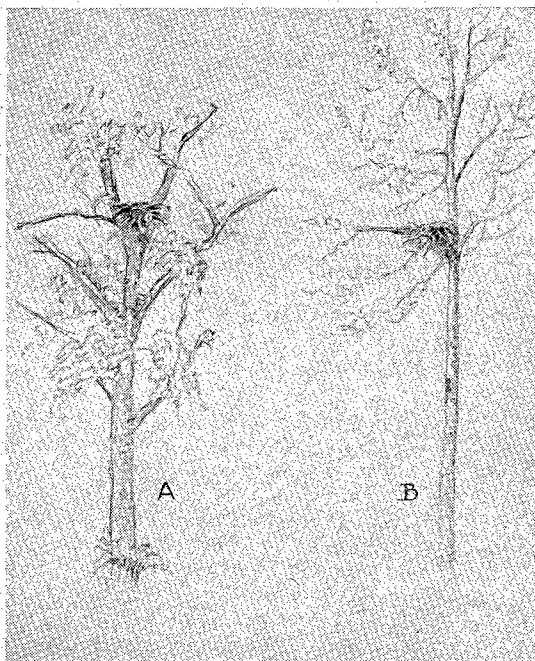


Figure 2. The nests of (A) *A. griseiceps* and (B) *A. nanus*, found in the Bolong Valley, Quarles Mountains. Drawn by Dr J. R. van Bloem, Augustus, 22, 1945.

Apparently a pair of this species was seen in the Quarles Mountains building a nest, which had almost been finished (June, 24). The nest was situated in a not very tall tree and only 500 m away from the nest of *A. griseiceps*, mentioned below. The structure looks like an ordinary Sparrow Hawk's nest (subgenus *Accipiter*) (fig. 2B). August, 5, an egg was found at the foot of the nesting tree, partly emptied, probably by a Crow (*Corvus enca celebensis*), which species was quite common in the valley. Measurements of the egg 38,1 x 28,8 mm; eggshell rather strong, not very glossy, colour white, membrane light greenish. Apparently no attempts of the birds were made to nest again. The birds could be seen flying very rapidly and with great dexterity among the trees. July, 1, an adult bird dashed upon a couple of chickens that were kept clandestinely in the camp; yet the hen proved to be watchful, and flew at the Hawk, which retreated.

In the field *A. nanus* can be distinguished from *A. trinotatus*, which is also a bird of the virgin forest, by its voice, being a fiercely pronounced klee-klee-klee-klee or kee-kee-kee-kee. The cry of *A. trinotatus* seems to be pronounced much more slowly.

As on a few occasions small white patches on the tail could be observed, it seems to be quite certain that the records from the Quarles Mountains refer to this species and not to *A. rhodogaster*, in which species white spots on the tail feathers are missing. *A. trinotatus* has a different voice; besides the three or four large white spots on the tail feathers appear to be quite conspicuous in the field.

Accipiter trivirgatus griseiceps

Coomans de Ruiter collected 7 specimens in the low forest regions of the extreme Northern Minahasa (Tonsea) as also in the mangrove near Pakin. "Sein eigentlicher Wohnort sind die offenen mit Waldpartien durchsetzten Mittelgebirge" (Heinrich, vide Stresemann, 1940, p. 484).

Found breeding in the Quarles Mountains in June. The nest was again situated in a not very tall tree, only 500 m away from the nest of the supposed *A. nanus*, mentioned above! Thus, both birds seem to breed in the same altitudinal region. The nest was built in the fork of a tree, and looks like the nest of a Goshawk (subgenus *Astur*) (fig. 2A). A young bird was first heard screaming on June, 29. June, 20, an adult bird was seen bathing in a small muddy pool near a shed, the beautiful creamy white underparts becoming rather dirty. Apparently no attention was given to the clear water of the small river Bolong, that was streaming through the valley nearby.

Voice a high, quite faint call, totally different from that of *nanus*.

Heinrich mentions the food to be categorically "lizards". Yet, Coomans de Ruiter recorded 4 x small bird, 1 x insects, 1 x grasshoppers, 1 x lizards, 1 x mouse. A great green Lizard of the *Calotes*-type was seen being torn into pieces on the nest with young in the Quarles Mountains. Thus, its diet seems to be quite variable, and leads us to suppose that this small robust Goshawk preys on anything he is able to take by surprise. He often seems to feed on the ground (cf. short tarsi!).

7. Literature.

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DOOR
Dr G. C. A. JUNGE.

***Phalacrocorax carbo sinensis* (Shaw en Nodder) — Aalscholver.**

159459	16-7-1935	jachtseizoen 1943/1944 geschoten te Oud Heusden. Drimmelen
162908	1-6-1936	als boven. Lekkerkerk
162808	3-5-1936	± 8-3-1944 dood gevonden te Sliedrecht. ibidem
177301	27-5-1941	18-5-1944 dood gevonden te Lekkerkerk. ibidem
177322	3-6-1941	Februari 1945 geschoten bij Pontevedra, Spanje. ibidem
121670	25-5-1935	10-3-1945 gedood te Rotterdam. ibidem

Nagekomen:

95436	17-6-1932	24-8-1938 geschoten tusschen Nieuwerkerk aan de ibidem IJssel en Moordrecht.
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***Ardea cinerea* L. — Blauwe reiger.**

117268	7-6-1939	2-4-1944 dood gevonden te Sainte Radégonde des Den Aniel Noyer, Vendée, Frankrijk. (Gr.)
121124	5-5-1933	Juni 1944 geschoten bij Leeuwarden. Hallum (Fr.)
200394	19-8-1944	27-12-1944 geschoten in de Houtrakpolder, Haarlem- Midden merliede (N.H.). Beemster