

The rediscovery of *Monarcha boanensis* (Aves: Monarchidae) from Boano Island, Indonesia

Moeliker, C.W., & Heij, C.J. 1995 - The rediscovery of *Monarcha boanensis* (Aves: Monarchidae) from Boano Island, Indonesia- DEINSEA 2: 123-143 [ISSN 0923-9308] Published 30 November 1995.

Since more than 50 years after its description, the black-chinned monarch *Monarcha boanensis* van Bemmelen, 1939 had only been known from a single specimen (the holotype) that was collected in 1918 on the Moluccan Island of Boano (Indonesia). Four expeditions to Boano in search of this bird were made between 1990 and 1994. The species was rediscovered in 1991 in a forested limestone gorge in the foothills of the mountainous part of the island. A juvenile was collected. The same area was surveyed again in 1994, then 5-10 individuals were observed of which several were heard singing. An adult was captured and photographed. This paper summarizes the expeditions and provides descriptions of the birds both in the hand and in the field. Data on the type-specimen, voice, food, behaviour, habitat and population size are given. As for taxonomy, it is concluded that *M. boanensis* is more closely related to the pied species-group, especially *M. leucurus*, than to *M. trivirgatus*. The rather intermediate position of the bird as to plumage and measurements supports its proposed, and already widely used, full-species status.

De herontdekking van Monarcha boanensis (Aves: Monarchidae) van het eiland Boano, Indonesië - Tot ruim 50 jaar na zijn beschrijving, is de Boano-monarch *Monarcha boanensis* van Bemmelen, 1939 uitsluitend bekend geweest van één enkel gebalgd exemplaar dat in 1918 werd verzameld op het Molukse eiland Boano (Indonesië). Ten einde meer over deze onbekende vogel te weten te komen, zijn tussen 1990 en 1994 vier expedities naar Boano ondernomen. In 1991 werd de soort herontdekt in een beboste kalksteen-kloof in het bergachtige deel van het eiland en werd een juveniel exemplaar voor nader onderzoek verzameld. In 1994 werd hetzelfde gebied bezocht en werden 5 tot 10 exemplaren, waarvan sommige zingend, waargenomen. Een adulte vogel werd gevangen en gefotografeerd. Dit artikel geeft een kort verslag van de expedities en uitvoerige beschrijvingen van de vogels in het veld en in de hand. Daarnaast wordt het holotype (opnieuw) beschreven en wordt ingegaan op de zang, het voedsel, het gedrag, de leefomgeving en de populatie-grootte van *M. boanensis*. Tenslotte wordt met betrekking tot de taxonomische positie van *M. boanensis* geconcludeerd dat dit taxon nauwer verwant is aan de zwart-witte soortgroep, met name *M. leucurus*, dan aan *M. trivirgatus*. De intermediaire positie die het verenkleed en de maten van de vogel binnen het genus *Monarcha* inneemt, ondersteunt zijn voorgestelde, en thans algemeen in gebruik zijnde, soort-status.

Correspondence: C.W. Moeliker & C.J. Heij, Natuurmuseum Rotterdam, P.O. Box 23452, NL-3001 KL Rotterdam, the Netherlands

Keywords: black-chinned monarch, *Monarcha boanensis*, Monarchidae, rediscovery, taxonomy, Moluccas, Indonesia

INTRODUCTION

The black-chinned monarch *Monarcha boanensis* van Bemmelen, 1939 is known only from a single specimen from Boano Island off the north-west coast of Seram, Moluccas, Indonesia

(Fig. 1). It was collected on 13 May 1918 by major F.J.P. Sachse and 'mantri' (collector) Denin, members of the Dutch geological Seram expedition lead by dr L. Rutten. The few birds

collected during the three days the expedition spent on Boano were forwarded to the Museum Zoologicum Bogoriense, Java (MZB) (Rutten 1918, 1919). It was not until 1939 that A.C.V. van Bemmelen examined the specimens from Boano in the MZB-collection. Among the material, he came across an unknown black-and-white flycatcher which was named *Monarcha trivirgata boanensis* van Bemmelen, 1939. In 1950 the type (and only) specimen was transferred to the Rijksmuseum van Natuurlijke Historie (RMNH), Leiden (now Nationaal Natuurhistorisch Museum) where it is still being preserved. It remained the only record of its existence for almost 75 years.

We mounted four expeditions to Boano Island with the purpose of rediscovering *M. boanensis*. The first (10 - 14 November 1990) covered the central lowlands and north-eastern coastal forests (Moeliker 1991), the second (22 - 25 November 1990) covered the southern mangroves and south-western coastal forests. Both searches failed to record any trace of the bird. In 1991 a third survey was conducted (20 - 26 October), then we focused on the mountains in the west-north-western part of the island. On 23 October

we had success. Three black-chinned monarchs were observed, one of them, a juvenile, was mistnetted and secured. The specimen is deposited in the Natuurmuseum Rotterdam (NMR 999700105). A fourth expedition took place from 31 October - 3 November 1994. The same area where the species was rediscovered in 1991 was surveyed again. Prolonged observations of several black-chinned monarchs were made, the song was recorded and an adult was captured, photographed, examined in the hand and subsequently released.

In addition to the fieldwork, the skin of *M. boanensis* and those of other Wallacean and Papuan members of the genus were studied in the Natural History Museums of Leiden (RMNH), Amsterdam (ZMA) and New York (AMNH). Appendix 1 lists their catalogue-numbers.

During our searches for *M. boanensis* we identified 68 species of birds on Boano, some of them were mistnetted and subsequently measured and photographed. Full data on those observations will be published ultimately. Appendix 2 lists all observed species.

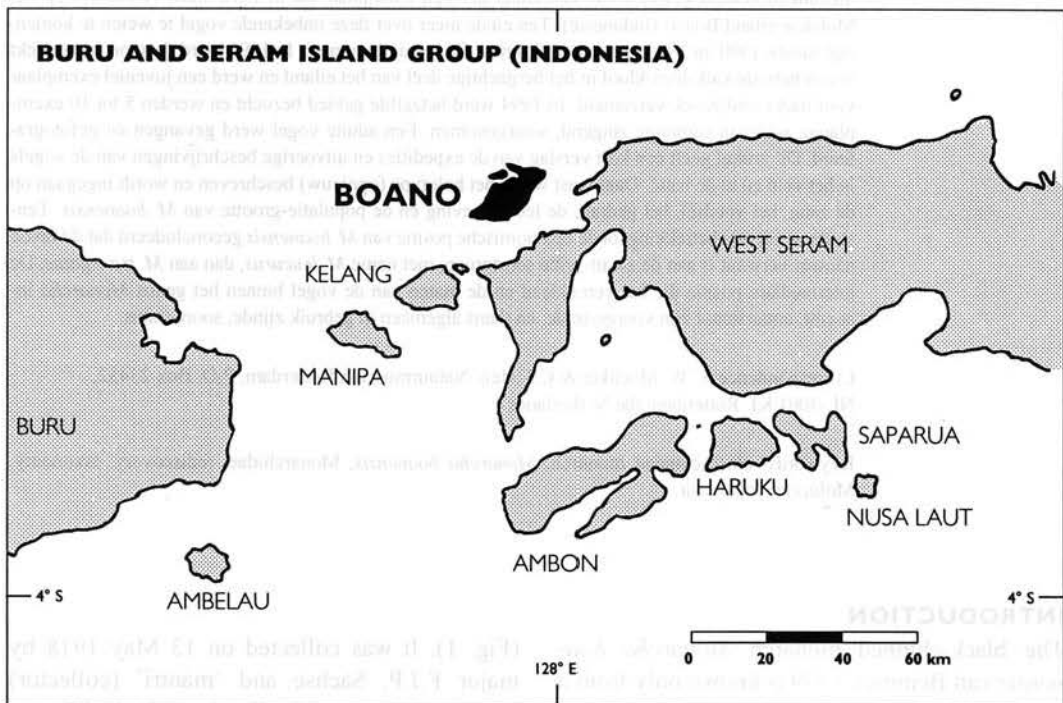


Figure 1. Buru and the Seram Islandgroup with the location of Boano Island [map-graphics: Jaap van Leeuwen Design]

BOANO ISLAND

Boano Island (149 km², 2°56'S, 127°56'E) (Fig. 2) can roughly be divided in two characteristic parts: a mountainous and a non-mountainous. The south-western, western and part of the north-western section are mountainous and consist of steep, inaccessible, thinly forested limestone-rocks with peaks up to about 600 m. The north, north-eastern and eastern sections are more or less flat with coconut *Cocos nucifera* stands along the coast, and in the inland area along-alang *Imperata nucifera* fields with kajaputi trees *Melaleuca leucodendron* and the odd relics of primary forest (mainly huge fig trees *Ficus* sp.). The southern and south-eastern coastal area consists of foothills fringed with mangroves. About 50% of the surface is mountainous. We consider the overall vegetation as rather depauperate. No vast stands of primary (undisturbed) forest occur. The local human population relies heavily on the natural resources. Timber-collecting occurs frequently, both in the lowlands and in the hills, for the construction of houses and the boat-building industry. At least five small size shipyards were found along the east coast in 1990. 'Bush-burning' is

common practice for shifting cultivation and in order to prevent the *Melaleuca* trees from growing up and thus to ease the picking of their leaves for kayaputih (eucalyptus) oil production. During our 1991 expedition large areas in the central lowlands were on fire. It should be noted though that already a century ago explorers judged the vegetation as being poor: '...nowhere a forest, just high grass with lonely trees, especially kayaputi ...' (Martin 1894).

THE 1991 EXPEDITION AND ITS OBSERVATIONS

After we had reached Boano from Piru (West Seram) by motorized dug-out canoe at 16.00h on 20 October, we recruited a guide and two porters and set off to make camp in the central lowland area before sunset. As in 1990, the only monarchine flycatcher of the open landscape was the slaty monarch *Myiagra galeata*. It was common in the *Melaleuca* trees surrounded by scattered scrub and along-alang. Next morning we walked in a westerly direction in an attempt to enter the hills where we suspected to find our bird, but the harsh limestone rocks of Gunung

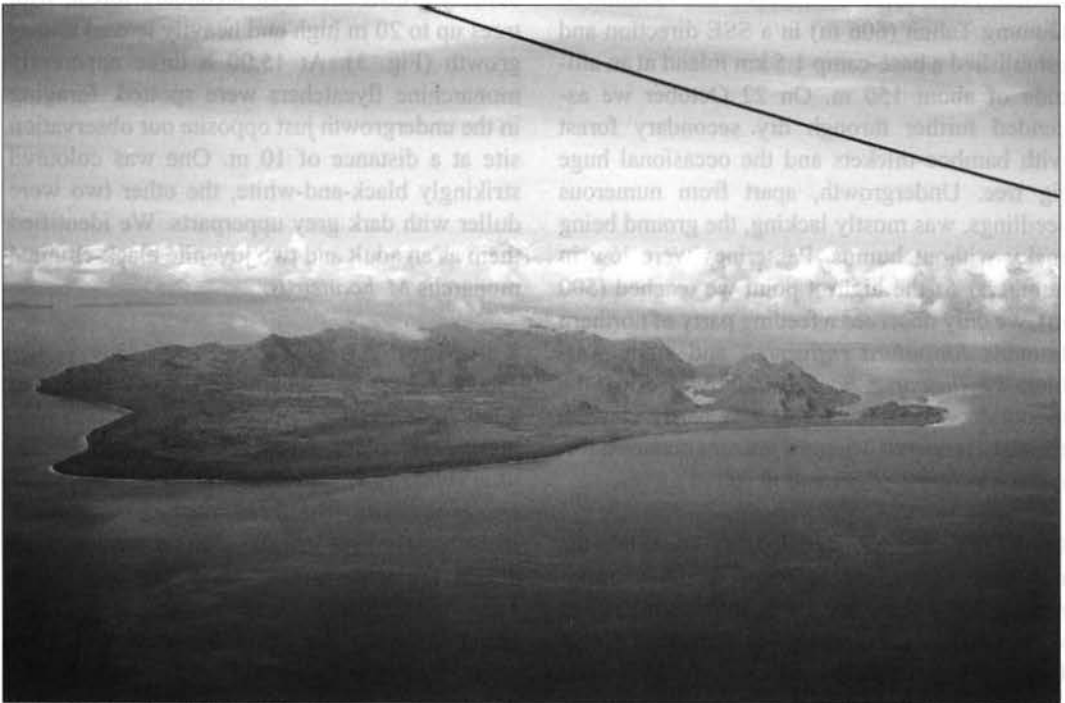


Figure 2 Boano Island from an altitude of 2000 m, seen from the north-east [photo: C.J. Heij, 15 January 1991]



Figure 3 The authors (left CWM, right CJH) in the habitat of *Monarcha boanensis*; Boano Island, WNW-part, 24 October 1991 [photo: F.J. Moeliker-Sag]

Nabaan (446 m) appeared to be inaccessible. So we headed north-west through a narrow valley, at its lowest point cladded with sago trees, and reached a settlement on the east bank of Strait Valentijn. This narrow sea-strait separates the uninhabited Pua island from the mainland of Boano. From there we climbed the foothills of Gunung Tahun (606 m) in a SSE direction and established a base-camp 1.5 km inland at an altitude of about 150 m. On 22 October we ascended further through dry secondary forest with bamboo-thickets and the occasional huge fig tree. Undergrowth, apart from numerous seedlings, was mostly lacking, the ground being rocky without humus. Passerines were low in numbers. At the highest point we reached (500 m), we only observed a feeding party of northern fantails *Rhipidura rufiventris* and arctic warblers *Phylloscopus borealis*. Halfway down the mountain, where the forest was partly cleared, the slaty monarch *Myiagra galeata* occurred frequently in forest-edges and in solitary trees.

On 23 October we decided not to climb the mountain again, but to focus on an approximately 500 m long and (at its maximum) 100 m wide, gradually ascending and narrowing gorge-like stretch of forest in the foothills at an altitude of about 150 m. There more undergrowth occurred and the overall vegetation was more lush

in comparison to the situation higher up the mountain. The stream which, apparently only during the rainy season, runs through the gorge was dry. Five stretches of mistnet were placed. We kept stationed at the end of the gorge where the limestone rocks rose steeply, overlooking a densely grown stretch of secondary forest, with trees up to 20 m high and heavily leaved undergrowth (Fig. 3). At 15.00 h three apparently monarchine flycatchers were spotted, foraging in the undergrowth just opposite our observation site at a distance of 10 m. One was coloured strikingly black-and-white, the other two were duller with dark grey upperparts. We identified them as an adult and two juvenile black-chinned monarchs *M. boanensis*.

Behaviour

The birds kept foraging together and were joined a few minutes later by two northern fantails *Rhipidura rufiventris*, an ashy flowerpecker *Dicaeum vulneratum*, and an island monarch *Monarcha cineracens*. The three black-chinned monarchs mostly kept low (0 - 2 m, at most up to 3 m) in the undergrowth consisting mainly of *Ficus* and *Coffea*. Their feeding action was frantic: dashing up and down the vegetation (frequently down to the forest floor) with fast lateral movements between twigs and leaves. Tails were frequently spread while feeding but not as often,

as wide and as conspicuously as the fantails did. Observations could not be made constantly as the monarchs moved out of sight often, although they returned frequently to the *Ficus* bush where they had turned up so suddenly.

Field characters

The birds showed the following field characters as observed with 10x42 binoculars at 6 - 15 m distance. ADULT: striking contrast between black upperparts and white underparts; black chin; clear white 'cheeks' extending (depending on posture of the head) around the shoulder (carpal joint) and contrasting with black side of head; black tail, showing conspicuous white patches on the outer feathers when spread; closed tail showing striking white lateral patches when seen ventrally (which occurred frequently); dorsally the closed tail appeared all black. Under some light conditions the forehead, loreal area and earcoverts appeared darker (more black) than the rest of the black upperparts, thus forming a kind of masked appearance. The white-spotted band on the forehead, as present in the type-specimen, was not seen. Bare parts: bill greyish blue, feet grey, eye dark. Voice: silent, the adult once produced a barely audible, short subdued rasping trill (for alarmcall after a juvenile was captured see below). JUVENILES: generally of a duller colour than the adult and thus less easy to be spotted in the vegetation; upperparts and tail dark slaty, remiges greyish brown, clearly contrasting with the slaty colour of back, scapulars and head; chin blackish; 'cheeks' white, not as striking as in the adult; underparts white, less pure than adult; tail tipped white laterally, as in adult only visible when spread or seen ventrally. Bare parts: bill dark with striking yellow base; feet light-grey; eye dark, strikingly large. Voice: silent, besides distress-call when removed from net (see below).

At 16.00 h the feeding-flock moved uphill and out of sight. We immediately replaced a mistnet towards the site where the monarchs were initially discovered. At 17.00 h we checked the net and found a juvenile black-chinned monarch struck in it about 20 cm above the forest floor. It had lost three lateral tail feathers, which were col-

lected. While the bird was removed from the net it uttered a harsh, screaming 'skreee, skreee, skreee'. The adult bird (with the other juvenile in the vicinity) approached us to about 5 m and responded with the rasping alarmcall 'schrrwie, schrrwie,' repeated continuously.

The next day (24 October) after the collected juvenile was skinned and preserved at the base-camp, we returned to the gorge. It was not until 15.40 h that an adult and a juvenile black-chinned monarch (most likely the same individuals) showed up foraging at the same site where they had been discovered the day before. The birds were among a mixed feeding party that apparently had come down from higher up the mountain to the lush and densely vegetated gorge. The 'flock', which dispersed quickly, consisted of *Rhipidura rufiventris* (2), *Dicaeum vulneratum* (1), *Myiagra galeata* (2), *Monarcha cineracens* (1), *Phylloscopus borealis* (2), and *Nectarinia aspasia* (3). The black-chinned monarchs kept feeding in the area until 16.15 h, but could only be observed properly for a few minutes. They maintained a low position in the undergrowth, most of the time as low as the forest floor.

THE 1994 EXPEDITION AND ITS OBSERVATIONS

In 1994 we set off for Boano by motorvessel from Waisala (West Seram) and directly approached the known *Monarcha* habitat from the Strait Valentijn. On 31 October we established base camp at 15.30 h in the same shed as in 1991. At 16.15 h we started our observations in the gorge. The vegetation was denser in comparison to 1991; more epiphytes occurred and the understorey contained dense thickets of bamboo *Dendrocalamus* sp., fig *Ficus* sp. and coffee *Coffea* sp. Five stretches of mistnet were placed in the early morning of 1 November. They were kept there until 3 November, 09.30 h when we left Boano and headed for Kelang Island. Observations were carried out daily between 06.00 h and 12.30 h, and 14.00 h and 18.30 h (dusk). One adult *Monarcha boanensis*, moulting its remiges and rectrices, was captured on 2 November 08.30 h, measured, described, photographed and subsequently released at 10.15 h.

On 31 October at 17.40 h, barely half an hour after we had started our observations, we were alarmed by some harsh *Monarcha* calls. Among a flock of about eight birds, consisting of *Phylloscopus borealis*, *Rhipidura rufiventris* and a juvenile *Myiagra galeata*, we discovered two adult black-chinned monarchs in a densely leaved tree at a height of about 6 m. The birds did not forage actively, but slowly moved between the branches and leaves.

Voice

One *M. boanensis* uttered a song twice: a clear 'tjuuu-tjuuu', immediately followed by a soft monotonous buzzing trill which faded away after about six seconds and during which the monarch moved its bill upwards to a vertical position. The buzzing part of the song resembles the song of a savi's warbler *Locustella luscinioides*. The birds did not get lower than 3 m, the song being performed at a height of about 6 m.

Field characters, behaviour and numbers

On 1 November, knowing the song, the first black-chinned monarch was heard at 07.15 h, about halfway the gorge, and the second one was heard and seen at 09.15 h at the narrow end of the gorge in the trees against the mountain wall. The latter bird displayed the frantic feeding behaviour close to the limestone rocks during which the tail was frequently spread (also observed in 1991). At the end of the afternoon an adult and a juvenile were seen foraging at ground level at the edge of a clearing. The juvenile showed brownish wings contrasting with slaty upperparts, a dark (grey) chin, an orange-buff breast (darker and more conspicuous than in the juveniles observed in 1991 which had a salmon-washed white breast that appeared dirty-white in the field) and white underparts; the tail showed white lateral patches. That day, during 10 hours of observation, six times a single and once two black-chinned monarchs were sighted for about 30-60 seconds each. In two of the adults white markings on the forehead were seen. In 1991 this feature (also present on the type specimen) was not noticed. In the captured adult the white markings were present (see below), though probably hard to observe in the

field. The masked appearance as observed in the 1991 adult (caused, depending on the light conditions, by glossier black forehead, loreal area and earcoverts) was apparent in two individuals. The captured adult did not show it. On 2 November the first singing monarchs were heard at 06.00 h, the song being repeated no more than five times. Although the song was deafened by the morning chorus of red-cheeked parrots *Geoffroyus geoffroyi* and yellow-bellied sunbirds *Nectarinia jugularis*, the characteristic buzzing trill could be heard rather easily at close distance. Singing monarchs were hard to spot. The late afternoon proved to be most rewarding to see black-chinned monarchs. At that time the noisy mixed feeding-flocks that appeared to descend from higher up the mountain (as also observed in 1991) were always joined by at least two individuals. Spotting foraging solitary birds in the dense understorey was difficult and time consuming. As only one or two birds were seen at a time, the total number of individuals was hard to establish. We estimate the number of adult black-chinned monarchs present in 'the gorge' during the 1994 survey, between 5 and 10 individuals. A maximum of three birds was heard singing simultaneously.

DESCRIPTION OF THE SPECIMENS

1 THE TYPE SPECIMEN (Fig. 4)

Van Bemmelen (1939) diagnosed and described the specimen from Boano as follows: 'Eine schwarz-weiße Rasse von *Monarcha trivirgata*, deutlich charakterisiert durch ein schmales weißes Band auf der Stirn, einen weißen Bürzel und die geringe Ausdehnung des schwarzen Kehlflecks, der auf das Kinn beschränkt bleibt, ungefähr 8 mm breit ist und sich von der Schnabelwurzel ungefähr 15 mm nach hinten ausdehnt. Culmen: 13 mm, Flügel: 79 mm, Schwanz: 78 mm.' ['A black-and-white race of *Monarcha trivirgata* clearly characterised by (1) a narrow white band on the forehead, (2) a white rump, and (3) the extension of the black throat-patch which is limited to the chin, measuring 8 mm in width and 15 mm from the base of the lower mandible downwards. Culmen 13 mm, wing 79 mm, tail 78 mm.']

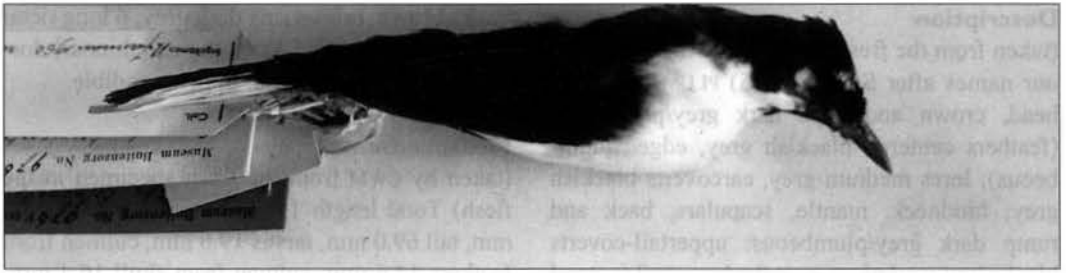


Figure 4 The type specimen of *Monarcha boanensis* van Bemmél, 1939 (RMNH 14055) [photo: C.W. Moeliker]

Examination of the type revealed a major error in the type description quoted above: a white rump was attributed to the specimen (and the taxon) but this was apparently caused by displaced undertail-coverts. Besides, an important character (the extent of white in the tail) was omitted. Therefore a redescription is given here together with the details as noted on the museum labels:

- RMNH 14055 *Monarcha trivirgata boanensis* van Bemmél, male, (Museum Buitenzorg No. 9764), TYPE, DAT. 13-V-1918, LEG. Exp. Dr. L. Rutten, LOC. eil. Boano N.W. van Ceram. Ingekomen: 12 januari 1950, Register no. 14055.

Description

PLUMAGE: forehead and crown black with a narrow white band just above the forehead, formed by the presence of irregular white (tipped) feathers; nape, lores, earcoverts black (extending just below the eye); chin black, 8 mm wide and extending 15 mm down from the base of the lower mandible to the throat. Remainder of throat white towards gape, thus forming clear white 'cheeks'; upperparts, including mantle, scapulars, remiges, upperwing-coverts, back, rump and uppertail-coverts

black (primaries more dusky brown); underparts including undertail-coverts white; inner 4 rectrices (T1-2) all black, outer pairs (T3-6) tipped white (see Table 1 for the amount of white as measured from the tip of each rectrix); dorsally the closed tail shows no white, when spread the tail shows a conspicuous black-and-white pattern. BARE PARTS: bill dark grey, feet grey.

Measurements

(taken by CWM) Wing (flat) 80 mm, tail 74 mm, tarsus 18.5 mm, culmen from feathers (exposed culmen) 13 mm, culmen from skull 16.5 mm, culmen from posterior side of nostril 10.5 mm. Tail slightly wedge-shaped: T6 11.5 mm shorter than T1 (84% of the length of T1) (Table 2).

2 THE 1991 SPECIMEN (Fig. 5)

- NMR 999700105, *Monarcha boanensis*, female, juvenile, ovary not fully developed, skull not completely ossified; 23-X-1991 17.00 h, Boano Island WNW-part, altitude 150 m, collected by C.W. Moeliker & C.J. Heij in undergrowth of secondary forest (mistnetted 20 cm above ground level); aanwinstnummer 91-369, ingekomen 25-XI-1991. [specimen preserved as skin with skull (posterior part of skull removed); carcass, guts, eyes, stomach contents and ovary preserved in 70% alcohol]

Table 1 Extent of white in the black tail of three specimens of *Monarcha boanensis* in mm measured from the tip of each rectrix, together with the relative amount (in %) of white in each rectrix and (T6/T1) the relative length of T6 in % (T1=100%) [T1 = inner (longest) pair, T6 = outer (shortest) pair; in = inner web; out = outer web; - = 100% black]

	T1		T2		T3		T4		T5		T6		T6/T1
	in	out (%)	in	out (%)	in	out (%)	in	out (%)	in	out (%)	in	out (%)	
type specimen (adult male)	-	(0)	-	(0)	16	282 (32)	38	34 (54)	35	40 (58)	33	37 (56)	84%
2-XI-1994 (adult -)	-	(0)	-	(0)	8	14 (18)	22	20 (34)	29	27 (47)	31	28 (52)	? ³
NMR 999700105 (juv. female)	-	(0)	-	(0)	-	(0)	15	13 (21)	20	20 (30)	23	16 (31)	87%

¹ left T2 with small white spot on tip of outer web
² both T3 with black spot on the edge of tip of outer web

³T1 longest, outer rectrices not fully grown (tail moulting)

Description

(taken from the fresh specimen in the flesh; colour names after Smithe 1975) **PLUMAGE:** forehead, crown and nape dark grey/plumbeous (feathers centered blackish grey, edged plumbeous); lores medium grey, earcoverts blackish grey; hindneck, mantle, scapulars, back and rump dark grey/plumbeous; uppertail-coverts blackish grey, dark grey at the base; tail (central pairs T1-2) blackish grey, outer pairs (T3-6) dark greyish brown, T4-6 tipped white (see Table 1); central tail-feathers and uppertail-coverts clearly darker than rest of upperparts; chin blackish grey, 13 mm downwards from center of base of lower mandible, 8 mm wide; throat white with few salmon feather edges, bordering the earcoverts and a narrow (3.5 mm) grey area below the eye, thus forming white cheeks; chest and side of breast white with salmon edges; belly, flanks, vent and undertail-coverts pure white; thigh light fuscous (like remiges); remiges and tertails light fuscous; greater primary-coverts fuscous; lesser and median primary-coverts fuscous edged plumbeous (lesser almost completely plumbeous); lesser, median and greater-coverts fuscous edged plumbeous (all coverts except greater primary-coverts darker fuscous than remiges); underwing-coverts white. **BARE PARTS:** bill dark grey with light (overhanging) tip, lower mandible with dark yellow base; gape dark yellow; feet dark plumbeous (blue-grey), soles buff-yellow; iris

dusky brown, orbital ring dark grey; 6 long rictal bristles laterally, and 4 (shorter and thinner) dorsally arising from base of upper mandible.

Measurements

(taken by CWM from the fresh specimen in the flesh) Total length 155.0 mm, wing (flat) 71.0 mm, tail 69.0 mm, tarsus 19.0 mm, culmen from feathers 14.6 mm, culmen from skull 16.4 mm, culmen from posterior side of nostril 11.2 mm. Tail slightly wedge shaped: T6 9 mm shorter than T1 (87% of the length of T1) (Table 2). **WING FORMULA** (taken from skin, primaries numbered ascendantly, inwards from tip of wing): P1 reduced, P5/6 longest; P1 32 mm shorter than P5/6, P2 13 mm shorter than P5/6, P3 4 mm shorter than P5/6, P4 1 mm shorter than P5/6. **MOULT:** non; remiges and rectrices moderately worn.

Stomach contents

Insect remains (100%), falling into three clearly distinguishable prey groups: (1) Heteroptera (bugs), one abundant small species (4-6 mm) and some remnants of smaller species; (2) Coleoptera (beetles), mainly small species (2-4 mm) as indicated by wingcases (elytra), a head of a weevil (Curculionidae) and a complete (4mm) click beetle (Elateridae); (3) Larvae of indeterminate insect groups, probably also Heteroptera and Coleoptera. Relative approximate abundance in the sample is: 40% Heteroptera,



Figure 5 The juvenile specimen of *Monarcha boanensis* (NMR 999700105) just before it was secured, 23 October 1991, Boano Island, WNW-part [photo: C.W. Moeliker]

Table 2 Measurements of three specimens of *Monarcha boanensis* in mm. For averages see Table 5. [wing: measured flat and stretched; tail: T1 longest rectrix (full tail length), T6 shortest rectrix; culmen: (F) from feathers, (S)= from skull, (N) = from posterior side of nostril]

	WING	TAIL		TARSUS	CULMEN (F)	CULMEN (S)	CULMEN (N)
		T1	T6				
type specimen (adult male)	80.0 / 80.0	74.0	62.5	18.5	13.0	16.5	10.5
2-XI-1994 (adult -)	80.0 / 80.5	69.0	57.0	18.0	14.2	18.2	11.0
NMR 999700105 (juv. female)	71.0 / 71.0	69.0	60.0	19.0	14.6	16.4	11.2

35% Coleoptera and 25% mixed Larvae. All insect prey (except larval part, which unknown) represent ground dwelling species and/or species that most likely occur on hard substrate like wood (J. Krikken, pers. comm.). The lack of (adult) Hymenoptera and/or Diptera is striking.

3 THE 1994 SPECIMEN (Fig. 6)

- *Monarcha boanensis*, adult, sex unknown, 2-XI-1994 08.30 h, Boano Island WNW-part, altitude 150 m, mist-netted 10 cm above ground level by C.W. Moeliker & C.J. Heij in undergrowth of secondary forest; silent; bird described, measured, photographed, weighed and subsequently released. Slides are kept in the Natuurmuseum Rotterdam.

Description

PLUMAGE: crown, nape, hindneck, mantle, scapulars, back, rump and uppertail-coverts black; forehead black, laterally with white spots at 8.5 mm from base of upper mandible (bordering the crown), formed by five white tipped feathers (two left, three right); chin black, 10.5 mm wide and extending 14 mm down from the base of the

lower mandible towards the throat, bordered distally by two rows of white feathers with grey edges; lores, narrow line just below eye and earcoverts black; 'cheek' (area between black chin and earcoverts) white; throat white, extending around the carpal joint of wing; rest of underparts including undertail-coverts white; thigh blackish; rectrices dusky brown with black outer webs (lighter than uppertail-coverts), T1-2 all dark, T3-6 tipped white (see Table 1); remiges dusky brown, outerwebs edged black (old remiges without black edges); tertials black; upperwing-coverts black; underwing-coverts white, lesser underprimary-coverts black, edged white. **BARE PARTS:** bill plumbeous (blue-grey) with darker tip and cutting edge of lower mandible; feet plumbeous, sole buff-yellow; orbital ring black, iris blackish brown.

Measurements and moult

(measured by CWM) Wing flat (right) 80.0 mm, wing flat (left) 80.5 mm; tail 69.0 mm, T1 longest; tarsus 13.2 mm; culmen from skull 18.2 mm; culmen from feathers 14.2 mm; culmen



Figure 6 The captured adult *Monarcha boanensis* just before it was released, 2 November 1994, Boano Island, WNW-part [photo: C.W. Moeliker]

from posterior side of nostril 11.0 mm; weight (10.15 h) 17.5 gr. Tail wedge-shaped: T6 12 mm shorter than T1 (83% of length of T1). WING FORMULA: (remiges numbered ascendantly) P1 reduced, P5 longest; P1 36 mm shorter than P5; P1 21.5 mm shorter than P2; P2 13.3 mm shorter than P3; P4 new, not fully grown. MOULT, full in wing and tail; wing: P1-3 old and worn (new P2 and P3 growing, old not shed); P4-9 new and fresh (P4 not fully grown); S1 new, almost fully grown; S2-9 (including tertials) old and worn (new S2 growing, old not shed); tail: (left half) T1-3 old and worn, T4 new and fresh, T5-6 old feathers shed, new growing (10-20% of full length); (right half) T1-3 old and worn, T4-6 old feathers shed, new growing (10-20% of full length).

GENERAL DISCUSSION

The black-chinned monarch was the last of the 15 endemic species of the Seram islandgroup to be 'rediscovered' (White & Bruce 1986, Bowler & Taylor 1993). To the best of our knowledge *Monarcha boanensis* has not been looked for since it was collected in 1918. No collector or ornithologist has visited Boano ever since. What is known about the birds of Boano, in addition to a note by Valentijn (1726), originates from the specimens D.S. Hoedt collected for RMNH on the island in 1863 (van Bemmelen 1948, Junge 1953, Mees 1964, 1982) and the few birds collected for MZB by the 'Rutten-expedition' in 1918. White & Bruce (1986) therefore list only a mere 12 species to occur on Boano, among them an endemic island race of the common paradise kingfisher *Tansyptera galeata boanensis* Mees, 1964 and the single-island endemic *Monarcha boanensis*.

Remaining habitat and surviving numbers

More than 70 years after the collection of the first specimen, *M. boanensis* still seems to survive. As is now known, the species inhabits a limited range in the mountainous part of Boano. In the rather depauperated open or thinly forested lowland area we did not encounter it. There the slaty monarch *Myiagra galeata* was common. The habitat in which we found *M. boanensis* is a gorge-like area in the west-north-western foothills at an altitude of about 150 m,

bordered by steep limestone rocks at its narrow end. It is grown with lush and dense secondary (semi-evergreen) forest (Fig. 3) and holds far more undergrowth than the vegetation higher up the hills. There the steep rocky outcrops are dry and thinly forested with deciduous trees or even devoid of any vegetation. The gorge obviously gets most of the water and thus develops the lush vegetation. We assume that such depressed lush areas between the hills still hold the population of the black-chinned monarch. We found just one patch of approximately 50,000 m² where the species feeds, displays its song and probably also holds territories. It seems likely though that other such areas occur in the mountainous part of the island. As this comprises approximately 70 km² (about half the island's surface) of which only a small fraction (probably no more than 20%) forms a suitable habitat, it is obvious that *M. boanensis* is an endangered species (see also Collar et al. 1994). Based on this restricted range, we estimate its current population size at a maximum of 100-200 individuals. It has already been noted that this situation probably exists for more than a century (Martin 1894). Recent cutting of trees for timber does irreversibly affect the island's ecosystem, but does not seem to focus on the patches of secondary forest where the black-chinned monarch still survives.

Status of related monarchs

The recent increase in field-studies of the Indonesian avifauna, especially those on remote islands, has yielded valuable data on the status of other *Monarcha*-taxa that were previously only known from museum specimens. On an island with a size comparable to Boano (Tanahjampea in the Flores Sea), the white-tipped monarch *M. everetti* (also a single-island endemic) seems to have a healthy population in degraded forest (Dutson 1995). The Flores monarch *M. sacerdotum*, described just two decades ago (Mees 1973) and until recently only known from two skins (in RMNH), was observed in 1993 in low densities in semi-evergreen rainforest in a small part of western Flores at altitudes between 350 and 970 m (Butchart et al. in press). No recent population assessments have been made from the other Wallacean and Papuan monarchs, though the black-bibbed *M. mundus*,

the loetoe *M. [leucotis] castus* (both from Tanimbar) and the white-tailed *M. leucurus* (from Kai) were observed to be 'fairly common' in 1992 (Lewis 1993). Also the black-tipped *M. loricatus* and the white-naped *M. [leucotis] buruensis*, both from Buru, were (locally) 'moderately common' (Jepson 1994). The spectacled monarch *M. trivirgatus* is still widespread in Wallacea: *M.t. nigrimentum* has recently been recorded in Manusela, Seram (Bowler & Taylor 1989) and *M.t. diadematus* on Obi (Linsley 1995). The RMNH-collection holds series of recently (1985) collected *M.t. bimaculatus* specimens from Halmahera and Bacan. The only presently unknown monarch is *M. julianae* from Kofiau (Western Papuan Islands). It was described from a single specimen (Ripley 1959) with no subsequent observations.

Food and feeding ecology

M. boanensis was mostly seen foraging in the lower parts of the undergrowth, frequently down to the forest floor. Both specimens were captured as close to the ground as 10 cm. This strongly indicates that food is actually taken from the forest floor, an assumption that is supported by the analysis of the stomach-contents of the collected juvenile: mostly ground dwelling coleopterid and heteropterid prey types. Birds were seen at a maximum height of 6-7 m (maximum tree height circa 20 m) though they did not display their active and rather frantic feeding behaviour there.

Little is known about the feeding ecology and niche relationship of Wallacean and Papuan monarchs. On Seram Stresemann (1914) found *M. trivirgatus* in the undergrowth. The black-and-white species were characterised as 'arboreal' by Ripley (1959), although Rand & Gilliard (1967) listed *M. manadensis* as a bird of the undergrowth and the dark low substage of the forest. Jepson (1994) observed *M. loricatus* in the undergrowth. *M. sacerdotum* was collected in the 'lower stages of primary forest' (Mees 1973) ('under-shrub' noted on fieldlabel of type specimen; pers.obs. in RMNH). The only monarch which is restricted to a montane habitat is *M. sacerdotum* (Mees 1973; Butchart et al. in press).

TAXONOMIC DISCUSSION

The taxonomic position of the black-chinned monarch is misty. Van Bemmelen (1939, 1948) considered it conspecific with *Monarcha trivirgatus*, being a black-and-white subspecies. Mayr (1944) stated the pied monarchs, *M. loricatus* (from Buru), *M. leucurus* (from Kai) and *M. everetti* (from Tanahjampea) to be part of the *manadensis*-section of the genus, rather than the *trivirgatus*-group, although he did not incorporate *M. boanensis* in his analysis. After the description of two new members of the genus (*M. julianae* Ripley, 1959 from Kofiau, Western Papuan Islands, and *M. alteralbus* Salomonsen, 1964 from Djaul, Bismarck Arch.), Mayr (1971) came to a further understanding of the relationship in the *manadensis* superspecies, but still he overlooked *M. boanensis*. Mayr (1986) followed van Bemmelen and listed the black-chinned monarch as a subspecies of *M. trivirgatus*, though he remarked 'perhaps a subspecies of *M. leucurus*' (in which he also included *M. loricatus* and *M. everetti*). White & Bruce (1986) assigned *M. boanensis* the rank of species within the *M. everetti - loricatus - leucurus - mundus* species group. The New-Guinea and Solomon species also form part of this group (the *manadensis* superspecies, see Mayr 1944, 1955, 1971). This view was recently followed by Andrew (1992). Sibley & Monroe (1990) listed the black-chinned monarch as *Monarcha [manadensis] boanensis*, being an allospecies within the *manadensis* superspecies.

The same position was attributed to *M. julianae* (see also Mayr 1986). The recently described *M. sacerdotum* from Flores is believed to be closely related or even conspecific to the *trivirgatus*-group (Mees 1973; Mayr & Vuilleumier 1983; Sibley & Monroe 1990), although recent field-observations support its status as a full species (Butchart et al. in press). According to Sibley & Monroe (1990) *M. mundus* from Tanimbar, Babar and Damar is closely related to *M. trivirgatus* and is sympatric with this species on Damar. Mees (1973) noted that *M. mundus* is in general appearance (apart from the bill) very close to *M. sacerdotum*. But given its peculiarly shaped bill, unique among the monarchs, *M. mundus* has a somewhat uncertain relationship

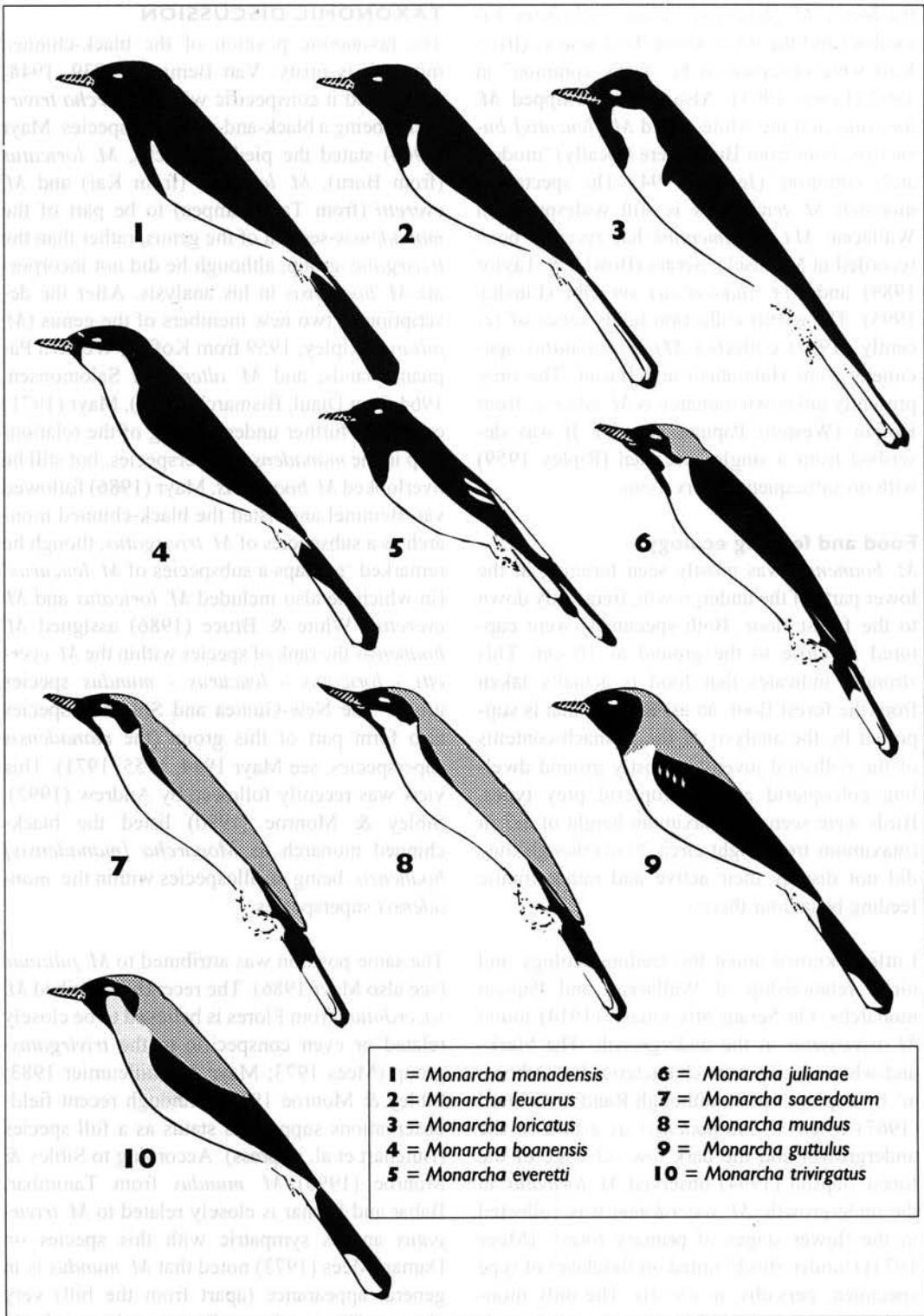


Figure 7 Adult plumage patterns of 10 Wallacean and Papuan monarchs [graphics: Jaap van Leeuwen Design, partly after Ripley (1959)]

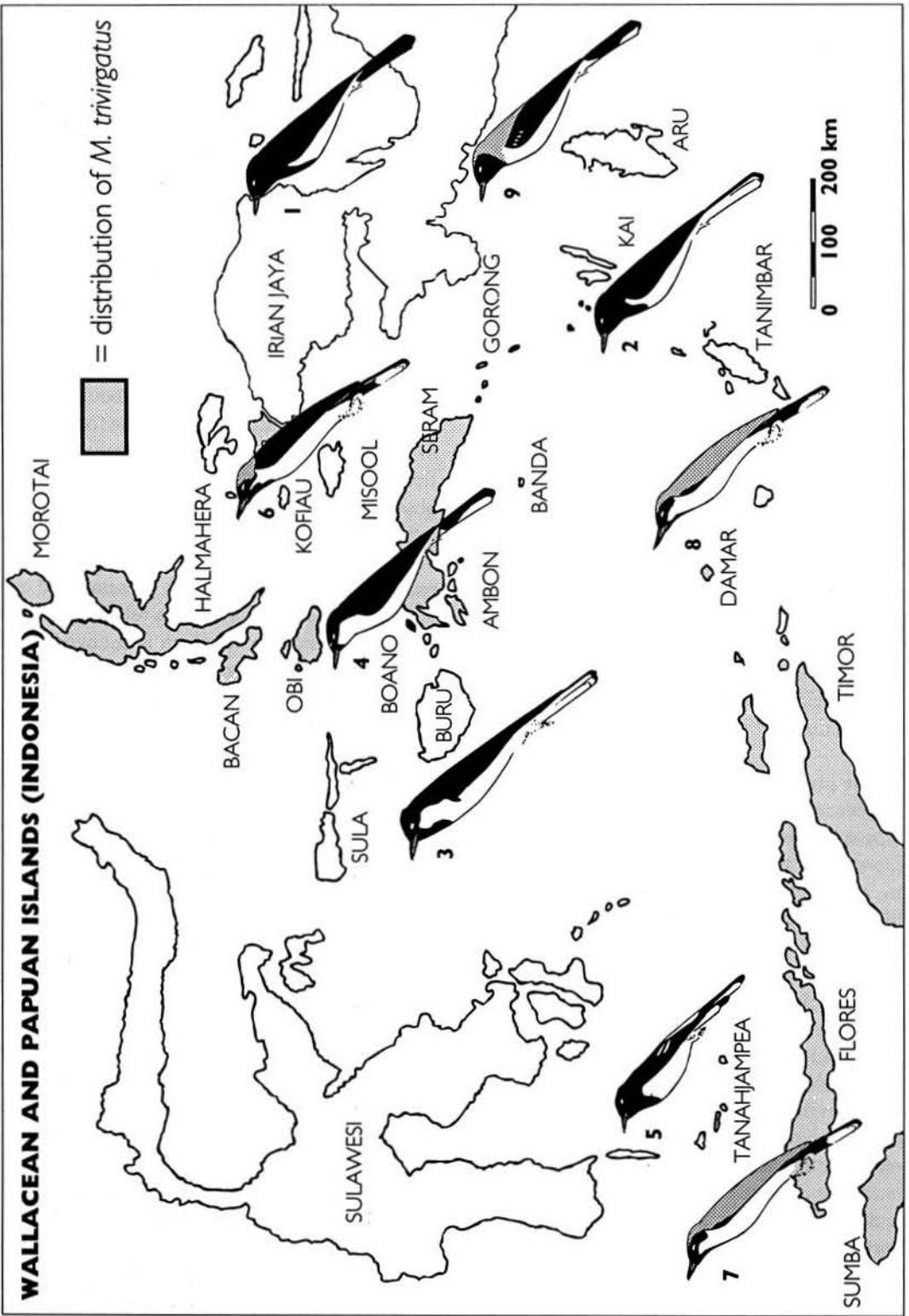


Figure 8 Distribution of 10 *Monarcha* taxa in the Wallacean and Papuan region, Indonesia (see Fig. 7); *M. pileatus* from Halmahera, *M. buruensis* from Buru and *M. castus* from Tanimbar are not depicted. [map-graphics: Jaap van Leeuwen Design]

within the genus and could not be placed in a superspecies (Mayr 1986). The widespread Papuan species *M. guttulus* is also believed to be related to *M. trivirgatus* (Sibley & Monroe 1990), but has kept its specific rank (see also Mayr 1986).

The small pied monarchs with white scapulars and white spotted earcoverts, crown and nape occurring on Halmahera (*M. pileatus*), Buru (*M. buruensis*) and the Tanimbar Archipelago (*M. castus*) are clearly far from *M. trivirgatus* and the *manadensis* superspecies. Sibley & Monroe (1990) conveniently allocated these taxa in the *leucotis* superspecies, stressing their close affiliation to *M. leucotis* from north-east Australia, as was already noted by White & Bruce (1986) and Mayr (1986).

Now, by discussing several plumage characteristics and measurements, an attempt will be made to enlighten the relationship between *M. boanensis* and the other Wallacean and Papuan members of the genus. Fig. 7 depicts the general adult plumage patterns of the studied taxa, Fig. 8 shows their distribution in the Wallacean and Papuan region.

Adult plumage

As became apparent after examination of the type specimen, *M. boanensis* lacks a white rump (*contra* van Bemmelen 1939). This was confirmed by our field observations. The plumage of the black-chinned monarch thus closely resembles the pied monarchs *M. loricatus*, *M. leucurus* and *M. manadensis*, with *M. boanensis* having only the chin black, whereas the other pied taxa exhibit an increasing amount of black down the throat and breast (Fig. 7). The white markings on the forehead (bordering the crown) of *M. boanensis* do not occur in the pied monarchs. The only congener of *M. boanensis* that shows white on the forehead/crown is *Monarcha trivirgatus diadematus* from Obi. In this taxon both male and female exhibit a well marked band that varies in colour from pure white to rufous (White & Bruce 1986, pers. obs. in RMNH and AMNH). This does indicate a relationship between *M. boanensis* and the *trivirgatus*-group, although *M. trivirgatus* always has some rufous

on its cheeks and breast, reduced or sometimes virtually absent in *M.t. diadematus* and *M.t. bimaculatus* from Halmahera (Meise 1929; pers. obs. in RMNH and AMNH). In addition, the upperparts of the *trivirgatus*-group are generally of a bluish-grey, rather than of a blackish colour; the blackish plumage parts being restricted to the facial mask (chin, forehead, lores, earcoverts), the lesser and median wingcoverts, and the tail. Some freshly moulted (adult) specimens of *M.t. diadematus* and *M.t. bimaculatus* do have black edged scapulars and mantle-feathers, giving the birds a very pied appearance in combination with much reduced rufous of the underparts (pers. obs. in RMNH and AMNH). It should also be noted that the white markings on the forehead of *M. boanensis* are not a constant feature. In the field it was not seen (or absent?) in most of the observed birds. The captured adult showed it rather marginally when compared to the extent of white on the forehead of the type specimen. It remains unknown whether the presence and extent of white on the forehead is related to sex or season. *M. sacerdotum*, which is believed to be part of the *trivirgatus*-group (Mees 1973; Sibley & Monroe 1990), lacks any rufous in its plumage and, together with *M. julianae*, *M. guttulus* and *M. mundus*, has a black-grey-white plumage. These taxa are best regarded as intermediate between the *trivirgatus*-group and the pied-species group (the *manadensis* superspecies).

Facial mask

The masked appearance of *M. boanensis* seen in the field under certain light conditions (e.g. in bright sunlight) is probably caused by the more glossy black forehead, loreal area, earcoverts and chin, in comparison to the other black plumage parts, although it was certainly not present in all individuals. It is a common feature in a number of other monarchs. In *Monarcha trivirgatus* the black facial mask and chin are very conspicuous because in general (together with the tail) they form the only black parts of the greyish upperparts. In the black-grey-white monarchs *M. mundus* from Tanimbar, *M. julianae* from Kofiau and *M. sacerdotum* from Flores the mask is also clearly present as it contrasts with the grey crown and nape. The Wallacean pied representatives of the genus, *M. loricatus* from Buru,

M. leucurus from Kai and *M. everetti* from Tanahjampea, show no glossy black mask and chin in museum specimens (pers.obs.), but their dark plumage parts do have an overall bluish-black gloss. There are no field records of these black-and-white species mentioning the masked appearance as we sometimes observed in *M. boanensis*. Examination of both the type and the captured adult did not reveal any contrast between the face and the other black parts of the plumage. The character is unlikely to be sex related as not a single black-and-white monarch from the Wallacean region is sexually dimorphic as to plumage (Hartert 1900). Male skins from the Papuan species *M. manadensis* do, however, tend to be more glossy black on the back (pers.obs. in RMNH and AMNH).

Juvenile plumage

The juvenile plumages of the studied *Monarcha* taxa show a great overlap in characters and are of little use in understanding the complex relationship of the Wallacean and Papuan members of the genus.

In the *trivirgatus*-group the greyish-blue upperparts have a brownish wash and lack any darker (black) margins, the black facial mask is lacking and the chin is greyish instead of black. The underparts are orange-rufous down towards the lower breast, but less deeply coloured than in adults. Besides, the extent of white in the tail is more or less reduced. (pers.obs. in AMNH and RMNH)

The pied species *M. loricatus* and *M. leucurus* exhibit a juvenile plumage that differs markedly from their adult plumage. The black head and upperparts are greyish (the mantle having a brownish wash), the remiges more brownish, the black chin, throat and breast are reduced to a weak greyish chin and throat, and the white underparts are deep orange-rufous down to the undertail-coverts in *M. loricatus*, and down to the belly and thighs in *M. leucurus*. The white in the tail is, notably in *M. loricatus*, more of a cinnamon colour. *M. manadensis* differs from this pattern in having a prominent dark grey chin, throat and breast. The juvenile upperparts of these three pied species greatly resemble the

general appearance of the *trivirgatus*-group. (pers.obs. in AMNH and RMNH; see also Siebers 1930 and White & Bruce 1986)

Three taxa deviate from these two juvenile plumage-patterns with respect to the head and underparts. *M. mundus* differs markedly in having the forehead, lores and earcoverts white and in lacking any trace of the black chin and rufous in the underparts (pers.obs. in AMNH and RMNH). *M. sacerdotum* shows white lores, malar area, chin and throat, and a 'peachy (orange) suffusion to lower throat, upper breast and upper breast sides', which was observed in the field in a varying intensity (Butchart et al. in press). In *M. everetti* the juvenile plumage shows a whitish chin and a light ochreous-buffy, instead of deep orange-rufous, breast (pers.obs. in AMNH), although Dutson (1995) stated the juvenile *M. everetti* as to be virtually identical to the juvenile *M. sacerdotum* except for the tail pattern and a deeper, more extensive orange wash on the underparts. The juvenile plumage of *M. julianae* is unknown.

The juvenile plumage of *M. boanensis* does not deviate from the plumage pattern of the *trivirgatus*-group and of *M. loricatus* and *M. leucurus*. The 1991 specimen (NMR 999700105) is, however, whitish (with a salmon wash) rather than orange-rufous below. The (single) juvenile observed in 1994 showed far more rufous on its breast and flanks. This varying intensity of orange-rufous in the underparts of the juvenile plumage was also observed in *M. sacerdotum* (Butchart et al. in press). Comparisons between the 1991 juvenile specimen of *M. boanensis* and juvenile skins of congeners showed that *M. leucurus* is closest as to plumage.

Tailpattern

The extent of white in the tail is a plumage feature that hitherto has not received much attention in the taxonomic treatment of the genus. Tables 3 and 4 summarize the results of careful examination of the black-and-white tailpattern of 15 Wallacean and Papuan *Monarcha* taxa. First the distinction between 'black-tipped, white tail'-taxa (Table 3) and 'white-tipped, black tail'-taxa (Table 4) can be made.

Table 3 Relative amount (in %) of black on the tip of each (white) rectrix, together with the minimum and maximum extent of white in mm measured from the tip (between brackets) in three Wallacean and Papuan *Monarcha* taxa, based on skins in AMNH, RMNH and ZMA [n = number of examined skins; T1 = inner (longest) rectrix, T6 outer (shortest) rectrix; - = 100% white; T6/T1 = relative length of T6 in % (T1=100%)]

taxon	n	T1	T2	T3	T4	T5	T6	T6/T1
<i>M. manadensis</i>	4	100	100	100	100	100	100	92
<i>M. leucurus</i> (ad)	7	100	100	variable ¹	-	-	-	85
<i>M. loricatus</i> (ad)	6	100 ²	31 (19-29mm) ³	14 (8-15mm)	4 (2-5mm)	-	-	86

¹ of 7 *M. leucurus* specimens: one black with white spot (20x6mm), two 100% white, two white with a black base of inner web, two tipped black (3-5mm) with black base of inner web.

² the all black T1 of *M. loricatus* had a 2mm wide white patch halfway its length along the shaft in one specimen;

³ the black tip of T2 in *M. loricatus* continues in a narrow (1-2mm) black edge of both outer and inner web down to its base in 2 specimens

Table 4 Relative amount (in %) of white on the tip of each (black) rectrix, together with the minimum and maximum extent of white in mm measured from the tip (between brackets) in 12 Wallacean and Papuan *Monarcha* taxa, based on skins in AMNH, RMNH and ZMA (*M. julianae* based on Ripley 1959) [n = number of examined skins; T1 = inner (longest) rectrix, T6 = outer (shortest) rectrix; - = 100% black; T6/T1 = relative length of T6 in % (T1=100%)]

taxon	n	T1	T2	T3	T4	T5	T6	T6/T1
<i>M.t. bimaculatus</i>	14	-	-	-	1 (0-3mm) ¹	13 (5-12mm)	23 (11-17mm)	87
<i>M.t. morotensis</i>	2	-	-	-	8 (0-10mm)	19 (9-14mm)	22 (12-16mm)	89
<i>M.t. diadematus</i>	8	-	-	-	8 (0-8mm)	18 (6-15mm)	23 (13-17mm)	90
<i>M.t. nigrimentum</i>	8	-	-	- ²	13 (1-15mm)	24 (10-22mm)	27 (12-22mm)	89
<i>M.t. wellsii</i>	3	-	-	-	24 (15-18mm)	38 (24-25mm)	43 (25-28mm)	88
<i>M.t. trivirgatus</i>	7	-	-	8 (0-11mm)	33 (13-28mm)	44 (24-34mm)	48 (25-34mm)	87
<i>M. guttulus</i>	4	-	-	-	16 (9-17mm)	25 (15-20mm)	27 (17-21mm)	89
<i>M. sacerdotum</i> (ad)	2	-	-	-	38 (22-28mm)	59 (33-40mm)	65 (38-41mm)	85
<i>M. everetti</i>	4	-	-	14 (5-11mm)	29 (11-22mm)	38 (18-23mm)	47 (20-28mm)	78
<i>M. mundus</i>	4	-	-	21 (8-21mm)	35 (22-25mm)	42 (26-28mm)	45 (28-29mm)	86
<i>M. boanensis</i> (ad)	2	-	-	25 (11-22mm)	44 (21-36mm)	53 (28-38mm)	54 (30-35mm)	84
<i>M. julianae</i>	1	-	-	? ³	?	?	40	85

¹ 5 specimens of *M.t. bimaculatus* showed a small (1-3x2mm) white spot on T4

² 1 specimen of *M.t. nigrimentum* showed a small (3x5mm) white spot on T3

³ T3-5 also tipped white, but extent unknown; type of *M. julianae* not examined

The 'black-tipped, white tail' type (Table 3) is present in just a few taxa, *M. loricatus* having it well marked, with the two outermost rectrices (T6-5) being all white, T4-T2 showing an increasing amount of black on the tips, and the inner rectrix (T1) being all black (see also Siebers 1930). In *M. leucurus* the outer three tailfeathers are all white and the inner two all black, with the remaining T3 showing an extremely individual variation, ranging from (almost) all black to all white.

The 'white-tipped, black tail' type is present in most of the studied taxa (Table 4). It is shown by all *M. trivirgatus* taxa and also in the pied (and black-grey-white) species *M. everetti*, *M. boanensis*, *M. julianae*, *M. sacerdotum*, *M. guttulus* and *M. mundus*. In all taxa the innermost rectrices

(T1-2) are 100% black (or dusky brown). In *M. trivirgatus* the first white tip appears on T3 in the nominate race, but in all other subspecies white emerges at T4. The extent increases towards the outer rectrix, reaching a maximum of 48% in *M.t. trivirgatus* and 65% in *M. sacerdotum*. The tailpattern of *M. boanensis* clearly differs from *M. trivirgatus*, in having already a large amount of white (25%) on T3 and a maximum extent of 54% on T6. *M. everetti* and *M. mundus* show a similar pattern, but the overall amount of white is less than in *M. boanensis*. *M. sacerdotum* lacks white in T3 but shows a great extent of white in T4-6, exceeding the amount of *M. boanensis* in T5-6. Data of *M. julianae* is deficient, but indicates a similarity with the non-*trivirgatus* taxa.

Table 5 Measurements of 15 *Monarcha* taxa based on specimens in AMNH, RMNH and ZMA (sexes combined, unless noted otherwise; all measured by CWM), *M. julianae* not examined, data taken from type description (Ripley 1959); (see Table 2 for explanation, ad = adult, juv = juvenile)

TAXON	n	WING		TAIL		TARSUS		CULMEN(F)		CULMEN(S)		CULMEN(N)	
		mean	(range)	mean	(range)	mean	(range)	mean	(range)	mean	(range)	mean	(range)
<i>M. boanensis</i> (ad+juv)	3	77.1	(71.0-80.5)	70.7	(69.0-74.0)	18.5	(18.0-19.0)	13.9	(13.0-14.6)	17.0	(16.4-18.2)	10.9	(10.5-11.2)
<i>M. boanensis</i> (ad)	2	80.1	(80.0-80.5)	71.5	(69.0-74.0)	18.3	(18.0-18.5)	13.6	(13.0-14.2)	17.4	(16.5-18.2)	10.8	(10.5-11.0)
<i>M. boanensis</i> (juv)	1	71.0		69.0		19.0		14.6		16.4		11.2	
<i>M.t. trivirgatus</i> (ad+juv)	7	72.7	(70.0-75.0)	73.9	(69.0-78.0)	18.1	(17.0-19.0)	10.9	(10.0-11.5)	16.2	(15.0-17.0)	9.0	(8.5-9.5)
<i>M.t. trivirgatus</i> (ad)	4	74.5	(73.0-75.0)	73.0	(71.0-77.5)	17.7	(17.0-18.0)	11.0	(10.0-11.5)	16.1	(15.0-17.0)	9.0	(8.5-9.5)
<i>M.t. trivirgatus</i> (juv)	3	70.3	(70.0-71.0)	75.0	(69.0-78.0)	18.5	(17.5-19.0)	10.8	(10.5-11.0)	16.3	(16.0-16.5)	9.1	(9.0-9.2)
<i>M.t. bimaculatus</i> (ad+juv)	14	71.3	(67.0-76.0)	69.6	(68.0-74.0)	16.7	(16.0-17.5)	11.8	(11.0-12.0)	16.3	(15.5-17.5)	9.4	(9.0-10.0)
<i>M.t. bimaculatus</i> (ad)	8	73.8	(72.0-76.0)	70.3	(68.0-74.0)	16.7	(16.0-17.5)	11.8	(11.0-12.0)	16.3	(16.0-17.5)	9.4	(9.0-10.0)
<i>M.t. bimaculatus</i> (juv)	6	68.2	(67.0-72.0)	68.3	(68.0-69.0)	16.6	(16.5-17.0)	11.8	(11.0-12.0)	16.2	(15.5-17.0)	9.3	(9.0-9.5)
<i>M.t. morotensis</i> ¹ (ad)	2	70.0	(70.0-70.0)	67.5	(67.0-68.0)	17.0	(17.0-17.0)	12.3	(12.0-12.5)	16.5	(16.5-16.5)	9.5	(9.5-9.5)
<i>M.t. diadematus</i> (ad+juv)	8	75.2	(71.0-78.0)	72.0	(69.0-76.0)	17.4	(17.0-18.0)	12.1	(11.5-12.5)	16.1	(15.0-17.5)	9.5	(9.0-10.5)
<i>M.t. diadematus</i> (ad)	5	76.8	(76.0-78.0)	72.8	(69.0-76.0)	17.5	(17.0-18.0)	12.3	(12.0-12.5)	16.5	(15.0-17.5)	9.7	(9.0-10.5)
<i>M.t. diadematus</i> (juv)	3	71.5	(71.0-72.0)	70.0	(70.0-70.0)	17.0	(17.0-17.0)	11.5	(11.0-12.0)	15.0	(15.0-15.0)	9.1	(9.0-9.1)
<i>M.t. nigrimentum</i> (ad+juv)	8	74.1	(71.0-78.0)	71.4	(67.0-75.0)	17.1	(16.0-18.0)	13.1	(12.5-13.5)	16.7	(16.0-17.5)	10.1	(10.0-10.5)
<i>M.t. nigrimentum</i> (ad)	2	75.3	(72.5-78.0)	72.0	(69.0-75.0)	16.3	(16.0-16.5)	13.3	(13.0-13.5)	17.5	(17.0-18.0)	10.0	(10.0-10.0)
<i>M.t. nigrimentum</i> (juv)	6	73.6	(71.0-77.0)	71.2	(67.0-75.0)	17.3	(16.0-18.0)	13.1	(12.5-13.5)	16.4	(16.0-17.5)	10.1	(10.0-10.5)
<i>M.t. wellsii</i> ² (ad+juv)	3	74.2	(73.0-76.5)	71.0	(70.0-73.0)	16.7	(16.0-17.0)	12.8	(12.5-13.0)	16.5	(16.0-19.0)	9.8	(9.0-10.0)
<i>M.t. wellsii</i> (ad)	1	76.5		73.0		16.0		12.5		16.5		9.5	
<i>M.t. wellsii</i> (juv)	2	73.0	(73.0-73.0)	70.0	(70.0-70.0)	17.0	(17.0-17.0)	13.0	(13.0-13.0)	16.5	(16.0-17.0)	10.0	(10.0-10.0)
<i>M. guttulus</i> (ad+juv)	4	76.3	(72.0-80.0)	73.3	(69.0-76.0)	17.0	(17.0-17.0)	12.0	(11.5-12.5)	17.0	(16.5-17.5)	9.9	(9.0-10.5)
<i>M. guttulus</i> (ad)	1	80.0		76.0		17.0		12.5		17.5		10.5	
<i>M. guttulus</i> (juv)	3	75.0	(72.0-76.0)	72.3	(69.0-75.0)	17.0	(17.0-17.0)	11.8	(11.5-12.0)	16.8	(16.5-17.0)	9.6	(9.0-10.0)
<i>M. mundus</i> (ad+juv)	4	76.0	(70.5-79.5)	73.5	(73.0-76.0)	18.5	(17.0-20.0)	15.5	(15.0-16.0)	18.8	(18.0-19.0)	13.5	(13.0-14.0)
<i>M. mundus</i> (ad)	3	77.8	(76.0-79.5)	73.3	(72.0-74.0)	20.0	(20.0-20.0)	15.3	(15.0-16.0)	18.7	(18.0-19.0)	13.3	(13.0-14.0)
<i>M. mundus</i> (juv)	1	70.5		74.0		20.0		16.0		19.0		14.0	
<i>M. everetti</i> (ad+juv)	4	63.8	(59.0-67.0)	69.5	(63.0-75.0)	18.3	(17.0-19.0)	12.4	(12.0-13.0)	15.8	(15.0-16.0)	9.1	(9.0-9.5)
<i>M. everetti</i> (ad)	3	65.3	(64.0-67.0)	71.7	(69.0-75.0)	17.7	(17.0-19.0)	12.2	(12.0-12.5)	15.5	(15.0-16.0)	9.2	(9.0-9.5)
<i>M. everetti</i> (juv)	1	59.0		63.0		18.0		13.0		16.0		9.0	
<i>M. sacerdotum</i> (ad)	2	71.0	(68.0-74.0)	71.5	(70.0-73.0)	16.5	(16.0-17.0)	11.6	(11.5-11.6)	15.0	(14.5-15.5)	8.0	(8.0-8.0)
<i>M. julianae</i> (ad)	1	81.0		73.5		?		?		17.0		?	
<i>M. manadensis</i> (ad+juv)	4	76.0	(71.0-82.0)	74.8	(71.0-77.0)	17.4	(17.0-18.0)	12.7	(12.5-12.8)	17.0	(17.0-17.0)	9.6	(9.0-10.5)
<i>M. manadensis</i> (ad)	3	77.7	(75.0-82.0)	74.7	(71.0-77.0)	17.2	(17.0-17.5)	12.7	(12.5-12.8)	17.0	(17.0-17.0)	9.8	(9.5-10.5)
<i>M. manadensis</i> (juv)	1	71.0		75.0		18.0		12.5		17.0		10.5	
<i>M. leucurus</i> (ad+juv)	12	75.8	(71.0-83.0)	75.2	(70.0-80.0)	18.1	(17.0-19.0)	12.6	(11.5-13.5)	17.4	(16.0-18.5)	10.1	(9.5-11.0)
<i>M. leucurus</i> (ad male)	7	78.4	(75.0-83.0)	76.3	(72.0-80.0)	18.2	(18.0-18.5)	12.6	(11.5-13.0)	17.5	(17.0-18.5)	10.4	(10.0-10.5)
<i>M. leucurus</i> (juv)	5	72.0	(71.0-74.0)	73.6	(70.0-79.0)	18.0	(17.0-19.0)	12.7	(12.0-13.5)	17.2	(16.0-18.0)	9.7	(9.5-10.0)
<i>M. loricatus</i> (ad+juv)	11	82.4	(74.0-89.0)	79.4	(72.0-85.0)	19.5	(19.0-21.0)	12.3	(11.5-13.5)	16.7	(15.0-18.0)	10.0	(9.5-10.5)
<i>M. loricatus</i> (ad male)	4	87.7	(86.0-89.0)	81.0	(79.0-84.0)	19.3	(19.0-20.0)	11.8	(11.5-12.0)	17.0	(17.0-17.5)	10.2	(10.0-10.5)
<i>M. loricatus</i> (ad female)	2	83.0	(83.0-83.0)	78.0	(77.0-79.0)	20.0	(19.0-21.0)	12.5	(12.5-12.5)	15.0	(15.0-15.0)	10.5	(10.5-10.5)
<i>M. loricatus</i> (juv)	5	79.0	(74.0-83.0)	79.0	(72.0-85.0)	19.4	(19.0-21.0)	12.5	(12.0-13.5)	16.9	(16.0-18.0)	10.0	(9.5-10.5)

¹ *M.t. morotensis* from Morotai Island is very close to *M.t. bimaculatus* (see: van Bemmelen 1948)

² *M.t. wellsii* from Gorong and Watubela Island is very close to *M.t. nigrimentum* (see: van Bemmelen 1948; Mayr 1986)

Measurements

Table 5 presents the biometrical data of 15 Wallacean and Papuan *Monarcha* taxa. In comparison to its congeners, *M. boanensis* has markedly longer wings than any of the Wallacean *M. trivirgatus* subspecies, but has shorter wings than the largest of the pied species-group (*M. loricatus*).

As to wing length, *M. boanensis* fits well within the range of the other pied monarchs *M. manadensis* and, especially, *M. leucurus*, and is equal to *M. julianae* and *M. guttulus*. The other parameters also show most overlap with the pied monarchs. *M. everetti* and *M. sacerdotum* are markedly smaller.

Conclusion

What appears, is that *M. boanensis*, being black-and-white, is closer to the pied species than to *M. trivirgatus* which always has (at least some) rufous in its underparts and grey in its upperparts. As to general plumage, *M. boanensis* is closest to *M. loricatus*. Also the study of the tail-pattern and measurements reveal a closer relationship with the pied species-group: the tail-pattern is similar to the 'black-grey-white' species and the measurements are closest to *M. leucurus* and *M. julianae*. The white markings on the forehead, however, do not exclude the *trivirgatus*-group as being related. This rather intermediate position eases answering the question whether the black-chinned monarch should be attributed the status of full-species or sub-species. We do not want to position the taxon in *M. leucurus* but do see a close relationship, also when the juvenile plumage is concerned. Therefore the proposed and already widely used full species status of *M. boanensis* (White & Bruce 1986) is best retained. Its position in the *manadensis*-superspecies (Sibly & Monroe 1990) is, pending further study, well chosen.

Further study of the complex taxonomy of the Wallacean and Papuan *Monarcha*-group, which according to Mayr (1986) represents an interesting case of recent active speciation, should focus on ecology (niche-relationship) and vocalisations, as these aspects of their biology are virtually unknown. With regard to the taxonomic position of *Monarcha boanensis* it would be interesting to find out if Kelang and Manipa, small islands that neighbour Boano and form stepping-stones between Seram and Buru (Fig. 1), hold populations of *Monarcha*-taxa. So far, non have been recorded and our brief visit to Kelang in 1994 did not yield any monarch either.

ACKNOWLEDGEMENTS

Dr A.C.V. van Bommel pointed us at 'the strange flycatcher from Boano' but he unfortunately died some weeks before we had rediscovered it. Dr G.F. Mees and his successor dr R.W.R.J. Dekker allowed us to study the rich *Monarcha*-collection of the RMNH. C.S. Rose-

laar pointed us at the small but fine series of monarchs in the Zoological Museum of the University of Amsterdam. Prof. dr K.H. Voous gave us overall support during our search. The Ministry of Education and Sciences of the Netherlands allowed the second author to conduct the Boano-surveys in 1990 and 1991 while upgrading the basic-science program at the Pattimura University of Ambon, Indonesia. The first authors 1991 trip to the Moluccas was financed by grants supplied by the Greshoff's Rumphius Fonds 1913 and the Rotterdams Natuurhistorisch Fonds. Prof. drs W. van Dijk accompanied us during the 1991 expedition and took care of the logistics and the guides and porters, so we could fully concentrate on our bird. E. Horn shaped the 1991 specimen into a real birdskin compared to the rather rough 'fieldtaxidermy' performed by the first author. E.J.O. Kompanje checked the preserved gonads of the specimen and confirmed the female sex. Mary LeCroy, Paul Sweet and the other staff members of the ornithology department at the American Museum of Natural History, New York, did not only allow the first author to study the *Monarcha*-specimens under their care, but also made his stay at the AMNH in 1994 a most pleasant one. The 1994 trip to Boano was carried out during the second authors research project on the moluccan megapode *Eulipoa wallacei*, surveying West-Seram and its satellite islands. During that trip we greatly appreciated the company and help of Pede Tuanaya and Ms. Christny Rompas (IPB, Bogor). Dr Idar M. (Waisala Medical Center) kindly lend us his ambulance-vessel and crew for a few days so we could comfortably sail to Boano and Kelang. Dr J. Krikken (Leiden) examined the stomach contents of the 1991 specimen and thus provided valuable data on the food and feeding habits of *M. boanensis*. G. Dutson supplied additional data on *M. sacerdotum* and *M. everetti*. Jaap van Leeuwen took care of the map-graphics and the preparation of Fig. 7. Finally, we thank our respective wives, Jale and Lydi, who were members of the 1991 team and endured the hardship of the expedition without even a single moan.

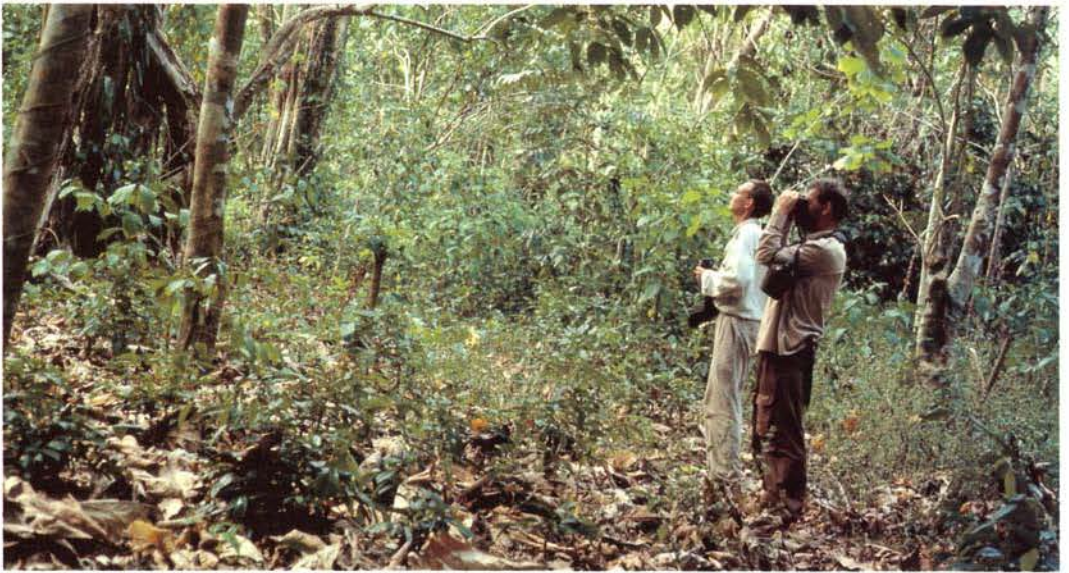


Figure 3 The authors (left CWM, right CJH) in the habitat of *Monarcha boanensis*, Boano Island, WNW-part, 24 October 1991 [photo: F.J. Moeliker-Sag]



Figure 5 The juvenile specimen of *Monarcha boanensis* (NMR 999700105) just before it was secured, 23 October 1991, Boano Island, WNW-part [photo: C.W. Moeliker]



Figure 6 The captured adult *Monarcha boanensis* just before it was released, 2 November 1994, Boano Island, WNW-part [photo: C.W. Moeliker]

REFERENCES

- Andrew, P., 1992 - The Birds of Indonesia, A Checklist (Peters Sequence) - Kukila Checklist no 1, Indonesian Ornithological Society, Jakarta
- Bemmel, A.C.V. van, 1939 - Eine neue Monarcha von der Insel Boano - Orn. Monatsberichte 47(5): 152-153
- Bemmel, A.C.V. van, 1948 - Faunal list of the birds of the Moluccan Islands - Treubia 19(2): 323-402
- Bowler, J. & Taylor, J., 1989 - An annotated checklist of the birds of the Manusela National Park, Seram (Birds recorded on the Operation Raleigh Expedition) - Kukila 4(1-2): 3-29
- Bowler, J. & Taylor, J., 1993 - The Avifauna of Seram - in: Edwards, I.D., MacDonald, A.A., & Proctor, J., (eds.) - Natural History of Seram, Maluku, Indonesia - Intercept Ltd, Andover
- Butchart, S.H.M., Brooks, T.M., Davies, C.W.N., Dharmaputra, G., Dutson, G.C.L., Lowen, J.C. & Sahu, A., in press - The conservation status of the birds of Flores and Sumbawa, Indonesia - Bird Conservation International
- Collar, N.J., Crosby, M.J., & Slatersfield, A.J., 1994 - Birds to Watch 2: the world list of threatened birds - Birdlife International (Birdlife Conservation Series no. 4), Cambridge, U.K.
- Dutson, G., 1995 - The birds of Salayar and the Flores Sea Islands - Kukila 7 (2): 129-141
- Hartert, E., 1900 - The Birds of Buru, being a list of collections made on that island by messrs. William Doherty and Dumas - Nov. Zool. 7: 226-242
- Heij, C.J., 1992 - Birdrecords of the Maluccas, part I (Ambon), part II (other islands) - Universitas Pattimura, Ambon
- Jepson, P., 1994 - Recent ornithological observations from Buru - Kukila 6 (2): 85-109
- Jones, D.A., Dekker, R.W.R.J., & Roselaar, C.S., 1995 - The Megapodes *Megapodidae* - Oxford University Press, Oxford
- Junge, G.C.A., 1954 - Ornithologisch onderzoek in de Indische Archipel - Ardea 41: 301-306
- Lewis, A., 1993 - Birding in Tanimbar and Kai - Oriental Bird Club Bull. 18: 52-54
- Linsley, M.D., 1995 - Some bird records from Obi, Maluku - Kukila 7(2): 142-151
- Martin, K., 1894 - Reisen in den Molukken, in Ambon, den Uliassern, Seran (Ceram) und Buru - E.J. Brill, Leiden
- Mayr, E., 1944 - The Birds of Timor and Sumba - Bull. Amer. Mus. Nat. Hist. 83: 123-194
- Mayr, E., 1955 - Notes on the Birds of Northern Melanesia, 3 Passeres - Amer. Mus. Novit. 1707: 1-46
- Mayr, E., 1971 - New species of birds described from 1956 to 1965 - Journ. f. Orn. 112 (3): 302-316
- Mayr, E., 1986 - Monarchidae (Australasian) - in: Mayr, E., & Cottrell, G.W., (eds.), - Check-list of Birds of the World. Volume 11 - Museum of Comparative Zoology, Cambridge, Massachusetts
- Mayr, E. & Vuilleumier, F., 1983 - New species of birds described from 1966 to 1975 - Journ. f. Orn. 124 (2): 217-232
- Mees, G.F., 1964 - Four new subspecies of birds from the Moluccas and New Guinea - Zool. Meded. 40(15): 125-130
- Mees, G.F., 1973 - Description of a new member of the *Monarcha trivirgata*-group from Flores, Lesser Sunda Islands (Aves, Monarchinae) - Zool. Meded. 46(12): 179-181
- Mees, G.F. 1982 - Bird records from the Moluccas - Zool. Meded. 56(7): 91-111
- Meise, W., 1929 - Die Vogel von Djampea und benachbarten Inseln nach einer Sammlung Baron Plessens - Journ. f. Orn. 77 (3): 431-479
- Moeliker, C.W. 1991 - Op zoek naar de vliegenvanger van Boano - Straatgras 3(2): 13-19
- Rand, A.L., & Gilliard, E.T., 1967 - Handbook of New Guinea Birds - Weidenfeld and Nicolson, London
- Ripley, S.D., 1959 - Comments on Birds from the Western Papuan Islands - Postilla 38: 1-17
- Rutten, L., 1918 - Uit het eerste verslag over de geologische expeditie naar Ceram (Voorbereiding, Samenstelling, Uitrusting, Vooruitzichten) - Tijds. Kon. Ned. Aardr. Gen. (tweede serie) 35: 112-121
- Rutten, L., 1919 - De geologische expeditie naar Ceram. Zesde verslag (april en mei 1918) - Tijds. Kon. Ned. Aardr. Gen. (tweede serie) 36: 42-48
- Sibley, C.G., & Monroe, B.L., 1990 - Distribution and Taxonomy of Birds of the World - Yale University Press, New Haven
- Siebers, H.C., 1930 - Fauna Buruana; Aves - Treubia 7 (suppl. 5): 165-303
- Smithe, F.B., 1975 - Naturalist's Color Guide - The American Museum of Natural History, New York
- Stresemann, E., 1914 - Die Vögel von Seran (Ceram). (Aus den zoologischen Ergebnissen der II. Freiburger Molukken-Expedition) - Novitates Zoologicae 21: 25-153
- Valentijn, F., 1726 - Oud en Nieuw Oost-Indiën (derde deel), Verhandeling der Vogeln van Amboina - Amsterdam & Dordrecht
- White, C.M.N., & Bruce, M.D., 1986 - The Birds of Wallacea (Sulawesi, The Moluccas & Lesser Sunda Islands, Indonesia) - B.O.U. Checklist No. 7, London

APPENDIX I Catalogue numbers of *Monarcha* specimens used in this study (AMNH = American Museum of Natural History, New York; NMR = Natuurmuseum Rotterdam; RMNH = Nationaal Natuurhistorisch Museum, Leiden; ZMA = Zoologisch Museum, Universiteit van Amsterdam; — = no catalogue number)

TAXON	COLLECTION	CATALOGUE NUMBERS
<i>M. boanensis</i>	RMNH	14055 (type)
	NMR	999700105
<i>M.t. trivirgatus</i>	AMNH	346083, 346086, 346090, 65466
	RMNH	Kat No 1, Kat No 2, Kat No 3 (type series)
	ZMA	2310
<i>M.t. bimaaculatus</i>	AMNH	467781, 467784, 467787, 467794, 467795, 654779, 654784, 654792, 654793
	RMNH	Kat No 4, Kat No 7, 84791, 84795, 84797
<i>M.t. morotensis</i>	AMNH	654795, 654796
<i>M.t. diadematus</i>	AMNH	654803, 654806, 654809, 654811
	RMNH	Kat No 2, Kat No 4, Kat No 5 (type ?)
<i>M.t. nigrimentum</i>	AMNH	654690, 654691, 654692, 654693, 654694, 654696, 654697
	RMNH	Kat No 16
<i>M.t. wellsii</i>	AMNH	654676, 654684, 654685
<i>M. everetti</i>	AMNH	266544, 654918, 654920, 654922
<i>M. loricatus</i>	AMNH	294994, 654887, 654892, 654906
	RMNH	Kat No 2, Kat No 4, Kat No 6, Kat No 8, —, 4612, 4612 ¹ , 27281
<i>M. leucurus</i>	AMNH	654874, 654875, 654876, 654879
	RMNH	Kat No 2, —, 699, 6774, 6774, 6774, 6774 ¹ , 27282
<i>M. manadensis</i>	AMNH	341164, 654818, 654819, 654828
<i>M. sacerdotum</i>	RMNH	68135 (type), 85260
<i>M. mundus</i>	AMNH	655374, 655379, 655380, 655388
<i>M. guttulatus</i>	AMNH	300855, 654982, 655003, 655013

¹several specimens are labelled with the same catalogue number

APPENDIX 2 List of Birds observed on Boano Island 1990 -1994, see also Heij (1992). [Sequence and nomenclature after White & Bruce (1986), except for the Megapodiidae which are listed according to Jones et al. (1995); subspecific names are only given for island endemics.]

<i>Calonectris leucomelas</i>	<i>Sterna bergii</i>
<i>Fregata minor</i>	<i>Chalcophaps indica</i>
<i>Phalacrocorax melanoleucus</i>	<i>Streptopelia chinensis</i>
<i>Pelecanus conspiciliatus</i> *	<i>Ptilinopus viridis</i>
<i>Ardea sumatrana</i>	<i>Ducula bicolor</i>
<i>Egretta alba</i>	<i>Geoffroyus geoffroyi</i> *
<i>Egretta intermedia</i>	<i>Charmosyna placensis</i>
<i>Egretta garzetta</i>	<i>Alisterus amboinensis</i>
<i>Egretta sacra</i>	<i>Eos bornea</i>
<i>Butorides striatus</i>	<i>Cuculus saturatus</i>
<i>Pandion haliaetus</i>	<i>Eudynamis scolopacea</i>
<i>Aviceda subcristata</i>	<i>Caprimulgus macrurus</i>
<i>Haliastur indus</i>	<i>Hemiprocne mystacea</i> *
<i>Haliaeetus leucogaster</i>	<i>Collocalia esculenta</i>
<i>Accipiter meyerianus</i> *	<i>Aerodramus infuscatus</i>
<i>Falco moluccensis</i>	<i>Tansyptera galeata boanensis</i> *
<i>Eulipoa wallacei</i> **	<i>Halcyon chloris</i>
<i>Megapodius forstenii</i>	<i>Halcyon sancta</i>
<i>Coturnix chinensis</i>	<i>Alcedo atthis</i>
<i>Pluvialis fulva</i>	<i>Eurystomus orientalis</i>
<i>Pluvialis squatarola</i>	<i>Monarcha boanensis</i> *
<i>Arenaria interpres</i>	<i>Monarcha cinerascens</i> *
<i>Calidris alba</i>	<i>Myiagra galeata</i>
<i>Phalaropus lobatus</i>	<i>Rhipidura rufiventris</i>
<i>Tringa totanus</i>	<i>Hirundo rustica</i>
<i>Heteroscelus brevipes</i>	<i>Phylloscopus borealis</i>
<i>Actitis hypoleucos</i>	<i>Cisticola exilis</i>
<i>Numenius phaeopus</i>	<i>Motacilla flava</i>
<i>Esacus magnirostris</i>	<i>Artamus leucorhynchus</i>
<i>Stercorarius pomarinus</i>	<i>Aplonis metallica</i>
<i>Chlidonias leucopterus</i>	<i>Nectarinia aspasia</i>
<i>Gelochelidon nilotica</i>	<i>Nectarinia jugularis</i> *
<i>Sterna sumatrana</i>	<i>Dicaeum vulneratum</i>
<i>Sterna anaethetus</i>	<i>Lonchura molucca</i>

* listed by White & Bruce (1986) as occurring on Boano [*Nycticorax caledonicus*, *Ducula perspicillata*, *Pitta elegans* and *Coracina ceramensis* are also listed, but not observed by us]

** not seen, fresh nesting burrows found

received 09 October 1995

accepted 01 November 1995