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Revised description of Pere David's Owl *Strix davidi* based on field observations in Central China

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Fig. 1. The very first depicture of Pere David's Owl turned up on Plate 3 in the book of David & Oustalet (1877). The aquarelle shows clearly radial streaks in the facial disc, accentuates the dark, plain plumage on shoulders and backside, indicates the long, staggered tail-feathers and the densely feathered tarsi and toes also. But on the other hand the illustration is missing some species-specific characteristics, like the row of white spots aside the shoulder, the white patterns on forehead and chin, as the white frames around the eyes also. – *Die früheste Abbildung von* Syrnium davidi *findet sich auf Tafel 3 im Buch von David & Oustalet (1877). Das Aquarell zeigt eine deutliche Radialzeichnung im Schleier, betont das dunkel-einfarbige Gefieder an Schulter und Rücken, die langen, gestaffelten Schwanzfedern sowie die bis an die Zehen dicht befiederten Beine. An arttypischen Merkmalen fehlen hingegen die weiße Fleckenzeile entlang der Schulter, die weißen Abzeichen an Stirn und Kinn sowie die weiße Augeneinfassung.* (Source/Quelle: http://gallica.bnf.fr/ark:/12148/bpt6k5408615z).

Aktualisierte Beschreibung des Davidskauzes *Strix davidi* nach Feldbeobachtungen in Zentralchina

In den Bergwäldern von Sichuan/China erlegte Pater Armand David im Herbst 1869 eine große Eule, die von Sharpe (1875) als neue Art erkannt und mit *Syrnium davidi* benannt wurde. Da seither nur ganz vereinzelt Nachweise und Beobachtungen zustande kamen, mussten auch neuere Publikationen auf die über 100 Jahre alte Originalbeschreibung des Typus aus dem Pariser Nationalmuseum zurückgreifen. Als Folge der unzureichenden Quellenlage kam es zu auffälligen Diskrepanzen bei Artbeschreibungen und Abbildungen innerhalb der Fachliteratur, die z. T. auch mit unseren Erfahrungen aus der Feldforschung nicht übereinstimmen.

Längenangaben für Körper und Großgefieder adulter Davidskäuze differieren im Schrifttum z. T. erheblich, weshalb Neuvermessungen des Typus aus dem Nationalmuseum in Paris und des Dresdner Balges angeregt wurden. Angaben zur Gesamtlänge für Männchen variieren zwischen 50,80 und 58,00 cm, was vermutlich auf einen „Zahlendreher" zurückzuführen ist.

Dank der Entdeckung eines kleinen Brutvorkommens im Waldreservat Lian Hua Shan/Provinz Gansu boten sich Möglichkeiten zu intensiveren Studien über Erscheinungsform, Gefiedermerkmale, Vokalisation und Brutbiologie dieser äußerst seltenen Eulenart. Auf der Basis von Feldstudien zwischen 1995 und 2013, Verhaltensprotokollen an Nistkasten-Bruten und zahlreichen Fotodokumenten wird hier nicht nur eine Revision der Artbeschreibung von *Strix davidi* vorgelegt, sondern deren Merkmale auch mit acht der derzeit anerkannten Unterarten des nächstverwandten Habichtskauz' *Strix uralensis* in Vergleich gesetzt.

Während die ostasiatischen Habichtskäuze (*Strix u. nikolskii, japonica, hondoensis, fuscescens*) durchwegs kleiner und zierlicher erscheinen als die Unterarten aus den borealen Wäldern Eurasiens (*Strix u. macroura, liturata, uralensis, yenisseensis*), weist der Davidskauz Schwanz- und Flügelmaße auf, die denen der größten Lokalformen aus Südosteuropa gleichen. Auch hinsichtlich des dunkelbraunen Gesamteindrucks fällt die Ähnlichkeit von *Strix davidi* mit den dunklen Morphen aus dem Balkangebirge auf (*Strix u. macroura carpathica*).

Von den für *Strix davidi* im Schrifttum als arttypisch benannten Gefiedermerkmalen der Altvögel können die meisten auch bei bestimmten Lokalformen oder Morphen des Habichtskauz' festgestellt werden. Die angeblich kennzeichnende Ring-Musterung im Schleier beim Davidskauz konnten wir bei den Individuen aus Lian Hua Shan nicht bestätigen. Die Beschreibung dieses Merkmals im Schrifttum dürfte auf einer Verwechslung mit dem Himalaya-Waldkauz *Strix nivicola ma* beruhen, den Pater David ebenfalls aus Moupin/Sichuan zurückbrachte, zumal er in der Typenbeschreibung von Sharpe (1875) vergleichend erwähnt ist.

Diese Konfusion wurde durch unklare Namensgebung, die zahlreichen zur damaligen Zeit verwendeten Homonyme und Synonyme innerhalb der Gattung *Ptynx, Syrnium* bzw. *Strix* noch bedeutend verschärft. Durch den Vergleich von Abbildungen, Verbreitungshinweisen und Längenmaßen wird z. B. zu klären versucht, auf welche Eulenart sich der alte Name *Ptynx fuscescens* tatsächlich bezieht, die in David and Oustalet (1877) beschrieben und abgebildet ist und in der Umgebung Pekings erlegt worden sein soll.

Die auffälligen Übereinstimmungen zahlreicher Details der Gefiederzeichnung (wie auch hinsichtlich Stimminventar und allgemeinem Verhalten) des Davidskauzes mit entsprechenden Merkmalen des Habichtskauz' lassen keinen Zweifel über die enge verwandtschaftliche Nähe dieser großen Waldeulen. Entsprechend wurde der Davidskauz im älteren Schrifttum als chinesische Subspezies von *Strix uralensis* eingestuft. Aufgrund der über große Zeiträume reichenden Isolation in den Bergwäldern Zentralchinas erscheint heute ein Artstatus für den Davidskauz als gerechtfertigt.

Key words: Pere David's Owl, Sichuan Wood Owl, *Strix davidi*, characteristics of plumage in adults and juveniles, specific patterns and their presentation, distribution in mountainous forests of Central China, comparisons with *Strix uralensis*.

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Introduction

Since our discovery of a small breeding population of Pere David's Owl – otherwise known as Sichuan Wood Owl– *Strix davidi* of at least 2–3 males and 2 females in the Lian Hua Shan Forest-Reserve, Gansu Province, in spring 1995 (Sun et al. 2001) we have successfully observed the species here on a number of occasions, and documented it by photograph and video. During a series of stays in the reserve between 1995 and 2013, we were able to confirm at least 11 successful broods, and to measure both eggs and nestlings (Tab. 1, 3 and 4). We took measurements of a specimen in the local museum (probably a female, collected by students in the reserve several years ago). We further describe field observations of 2 males in Jiuzhaigou National Park (Sichuan Province; see map in Fig. 18).

Published portrayals of this species refer to rather meagre data in the original description of the type-specimen *Syrnium davidi* by Sharpe (1875), together with a more detailed elaboration in the Catalogue of the British Museum by Sharpe and Gunther (1875), a further description in David and Oustalet (1877), accompanied by an aquarelle (Plate 3 = *Syrnium davidi*; Fig. 1), and lastly to a notice in Stresemann (1923; *Strix uralensis davidi*). In consequence all assertions are deduced from only 2 male specimens: Sharpe = male from Moupin/Sichuan, collected by A. David, Museum National d'Histoire Naturelle, Paris; Stresemann = male from Hwanglungsze/Sichuan, collected by Hugo Weigold, Staatliches Naturkunde Museum Dresden. The last specimen was depicted in water-colours by Quintscher (in Eck and Busse 1973) and by Weick (in König and Weick 2008). – Descriptions of another Pere David's Owl, shot by F. Smith in 1931 in eastern Sichuan, stay unrecorded (Traylor 1967).

Any illustrations in field guides and handbooks are based on these same sources, and depicture of details varies with the imagination of the artists. In consequence, the individual drawings do not only differ broadly amongst themselves (comp. Fig. 13.), they also differ greatly from the appearance in the field (Fig. 2). – We take these discrepancies as a justification systematically to describe habit, plumage, and behavioural performance of distinct characters of the plumage, based on our recent findings, although the number of individuals is rather small. – We also discuss the discrepancy in published data concerning the total length of *Strix davidi*. In particular we compare the original description of the type-specimen (Sharpe 1875) with data in recent literature and our own measurements.

Study-area and methods

Field-research on Pere David's Owls was conducted predominantly in the Lian Hua Shan Natural-Reserve in Province of Gansu, Central China (34°56–58′ N, 103°44–48′ E). This reserve covers about 12,550 ha of high-mountainous and alpine landscape, reaching elevations of 3,578 m at its highest summit. As suitable conditions for woodland vegetation are restricted to northern slopes, only 1,170 ha of mature coniferous forest are available for wood-owls. Beside such forest stands, Pere David's Owl's habitat also includes clearings and pastures grazed by yaks (detailed description of woodland-habitats in Klaus et al. 1996, Sun et al. 2008). Because over-aged old

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Fig. 2. Pere David's Owl is a big wood-dwelling bird of dark brown appearance, with a pronounced facial-disc, blackish-brown eyes, light breast-feathers with contrasting stripes, and a conspicuous long tail. Strong talons characterize this powerful owl (female in alert position, Lian Hua Shan, 2012). – *Der Wald-bewohnende Davidskauz erscheint als große, sehr dunkle Eule mit ausgeprägtem Gesichtsschleier, schwärzlich-braunen Augen, dunkler Längsstreifung auf hellerem Brustgefieder und einem auffällig langen Schwanz. Starke Krallen zeichnen diese kräftige Eule aus (Weibchen, in erregter Aufmerksamkeit, Lian Hua Shan, 2012).* Photo: W. Scherzinger

Tab. 1. Time-table of field-observations in Lian Hua Shan-Forest-Reserve 1995–2013, and acquired material as base for our analysis and discussion (Supply of nest-boxes from 2005). – *Zeitplan der Aufenthalte im Waldreservat Lian Hua Shan 1995–2013, mit Eintragung der für Analyse und Diskussion wesentlichen Beobachtungen (Nistkastenangebot ab 2005).*

2006	**month**	**location**	encounter	territorial song male	territorial song female	female begging	nest-site demonstr.	prey delivery	copulation	clutch	brooding	brood-caring nestlings	brood-caring fledglings	begging young owls	alarm	nest defense, distraction	prey, pellets, hunting	mobbing against owls
1995	April	A-Line	■	■	■	■	■	■	■									■
1997	May	B-Line	■	■	■													
1999	July	B-Line	■	■	■	■												
2003	May ?	?	■															
2004	May	rocky crest		■														
2004	May	B-Line		■														
2005	May-June	B-Line	■	■	■	■		■		■	■	■	■	■	■	■	■	
2006	May-June	B-Line	■	■		■	■										■	
2006	April-May	rocky crest	■	■	■	■	■						■	■	■	■	■	■
2007	April-May	B-Line	■							■	■	■	■			■		
2010	March-July	B-Line	■	■	■			■	■	■	■	■	■	■	■	■	■	■
2010	March-April	rocky crest	■	■	■	■	■		■									■
2011	April-June	B-Line	■	■						■	■	■		■			■	
2011	June	rocky crest	■	■								■	■	■	■	■		
2012	May-June	B-Line	■		■	■	■	■		■	■	■	■	■	■	■	■	■
2012	April-June	rocky crest	■	■	■	■	■			■	■	■	■	■	■	■	■	■
2013	October	B-Line		■	■	■	■											
2013	October	rocky crest		■														

growth woodland, rich in big trees with broken tops or cavities for nest-sites was lacking, some 50 big nest-boxes were mounted (Fang 2005). From 2005 onward the owls bred successfully in these artificial breeding sites, which enabled us to observe and monitor breeding behaviour, clutches, and nestlings of *Strix davidi* for the very first time (scheme of fieldwork 1995–2013, in Tab. 1). For comparative studies and tape recordings of this species we also visited the Jiuzhaigou National Park in Province of Sichuan.

While caring for their offspring, the adult owls stay active even in daylight, to hunt and feed as well as to defend the brood and territory. During daytime, we successfully photographed their impressive flight silhouettes under favourable light condition. We accomplished detailed protocols of behaviour, and informative photo- and video-documentation as well. (Several automatic cameras with infrared-sensitivity were mounted at and in nest-boxes). The very first photo of this owl was produced during our first stay in Lian Hua Shan-Reserve in 1995 (published in Scherzinger 2005, Scherzinger and Fang 2006). Meanwhile, photo-documents of Pere David's Owl are available in the internet from Jiuzhaigou National Park and some places in Sichuan (f. i. Demeulenmeester 2008, Zoothera 2013, Eaton 2014, Francis 2014, Hui 2014, Jiawei 2014, Shapiro 2014), recently also published in the synopsis of Mikkola (2012).

In addition to observations in the field we made an extensive survey of descriptions of Pere David's Owl in the literature, from the very first announcement by Armand David (1871; named firstly *Ptynx fulvescens* by Verreaux), and the original descriptions of the type-specimen by Sharpe (1875; named *Syrnium davidi*), to today's publications. Comparisons of Pere David's Owl with the numerous subspecies of *Strix uralensis* are based on long-time studies in captivity and in the woodlands of the Bavarian Forest National Park, supported by specimens in scientific collections, literature, and by photos from colleagues in different parts of Europe and from internet-galleries.

Results

Adult plumage patterns, based on field-observations. As Stresemann (1923) diagnosed, Pere David's Owl appears much darker and duller in its basic colour than Ural Owls (*Strix uralensis*) or Great Grey Owls (*Strix nebulosa*) of nearly the same size (Fig. 2 and 3). The dark chocolate-brown, nearly spotless back continues in unicoloured tail coverts (Fig. 4 and 5-b, -c and -e). In accordance with Sharpe and Gunther (1875) a row of coarse, whitish drops runs along the border between the scapulars and lesser wing-coverts. In a similar pattern several white spots on the secondary wing-coverts form a clear row across the wing (Fig. 3-a, 4-c, and 5-c). Within a total of 10 primaries, the outermost feather (P. 10) shows a highly distinctively fringed margin, as can be noticed also at the tips of P. 9 and P. 8 in a less pronounced structure (Fig. 6-b). Remarkably, these ctenoid structures cover also the outermost secondaries, and even the pennon of the "thumb" (alula). The central, slightly pointed tail feathers are prolonged, and of dark brown colour also, mostly with inconspicuous scribbling. The specimen from the Lian Hua Shan Museum (probably a female) and one of the wild females however showed faded flecks on the central tail-feathers (T. 1; like relict bars), with irregular spots or delicate scribbles to the top. In flight one of the males showed rufous T. 1, without any pattern (photo in Fig. 4-a, 5-e; intraspecific variability in Fig. 7).

The light coloured breast feathers are marked with dark stripes; arranged denser, broader, and faded on the upper part (making the neck appear darker, "cloudy"), but longer and narrowing in the lower part (which makes the belly lighter and more contrasting). Crossing bars of dull ochre may occur on belly and flanks only (described as "reddish cross-bars" in Sharpe and Gunther 1875). – The undertail-coverts are marked by coarse and dark cross-bars (mentioned in Sharpe and Gunther 1877; illustrated also in David and Oustalet 1877; Fig. 1, and 3-c).

The forehead looks uniform brown, which intensifies the contrast of a white pattern, forming a clear V (called a silky white strip, like eyebrows in David and Oustalet 1877). These marks are shaped by series of white spots on the outer parts of the facial ruff, and on feathers on both sides of the forehead (Fig. 8-d). The pattern seems to vary individually, as we observed fine, long lines as well as stout, short "branches". In concern with changing behavioural moods, this conspicuous pattern may appear in variable shapes: In a roosting position two small rows of white feathers form a dull V; but when alert or aroused the owl's forehead presents a contrasting V-shaped pattern; in some individuals reaching from the outer rim of the facial disc sideward to the temples.

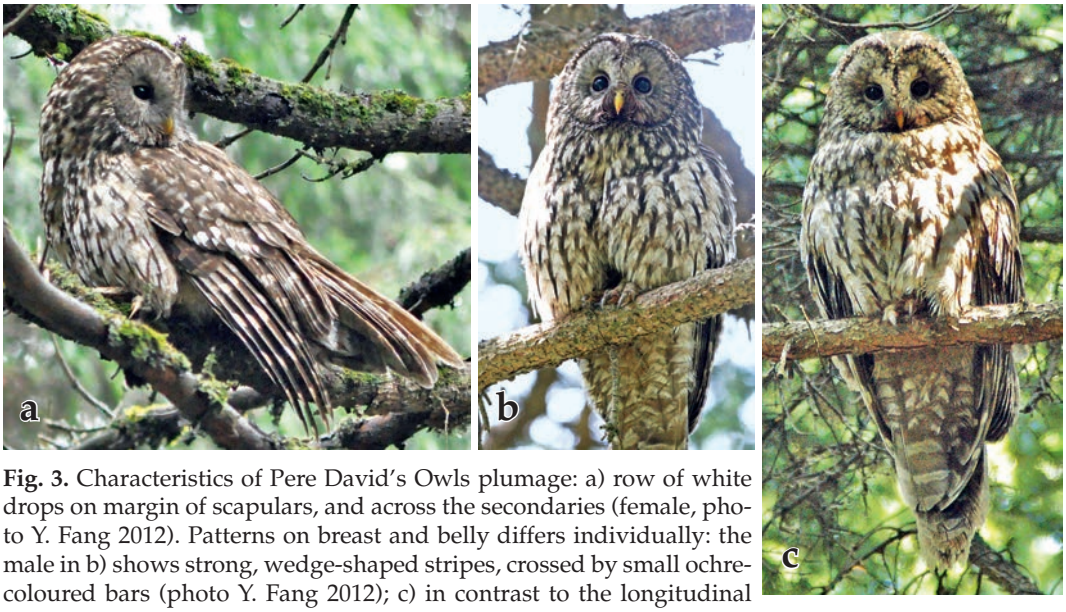


Fig. 3. Characteristics of Pere David's Owls plumage: a) row of white drops on margin of scapulars, and across the secondaries (female, photo Y. Fang 2012). Patterns on breast and belly differs individually: the male in b) shows strong, wedge-shaped stripes, crossed by small ochre-coloured bars (photo Y. Fang 2012); c) in contrast to the longitudinal stripes on breast and belly the under-tail-coverts are strongly barred (female, photo S. Klaus). – *Gefiedermerkmale des Davidskauz': a) kräftige weiße Tropfenreihe am Außenrand des Schultergefieders und zartere Reihe quer zu den Armdecken (Weibchen). Die Zeichnung an Brust- und Bauchgefieder kann individuell variieren: das Männchen in b) zeigt kräftige, pfeilförmige Streifen, die von zarten, ockerfarbenen Querwellen gekreuzt werden. c) Im Gegensatz zur Längszeichnung an Brust und Bauch, sind die Unterschwanzdecken kräftig quer gebändert (Weibchen).*

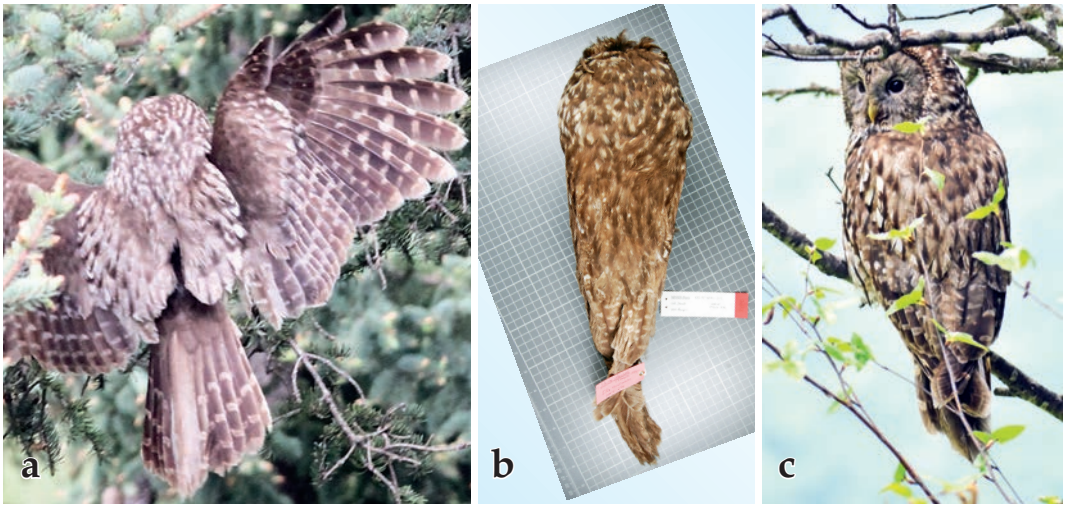


Fig. 4. Characteristics of Pere David's Owls plumage: colour and pattern on back-side vary from dark chocolate-brown to coarsely spotted tawny: a) male (Lian Hua Shan; photo Y. Fang 2012); b) type-specimen National Museum, Paris (Moupin; photo A. Previato 2014); c) female (Lian Hua Shan; photo W. Scherzinger 2012). – *Gefiedermerkmale des Davidskauz'; manche Individuen zeigen anstatt des typischerweise dunkel-schokobraunen Rückengefieders ein grobfleckiges Muster auf hellerem Untergrund: a) Männchen aus Lian Hua Shan; b) Typus-Exemplar aus dem Nationalmuseum Paris (gesammelt bei Moupin); c) Weibchen aus Lian Hua Shan.*

Fig. 5. Characteristics of Pere David's Owls tail-feathers: a) in juveniles, the pattern of central tail-feathers (T. 1) is not clearly differentiated from T. 2–6 (male, about 4 weeks old; photo W. Scherzinger 2012). In females we mostly noted spotty flecks and scribbled lines at the central tail-feathers (b) photo Y. Fang 2012, c) photo W. Scherzinger 2012; d) specimen of Lian Hua Shan-Museum; photo W. Scherzinger 2013. e) This male shows plain feathers in the centre of the tail, unicoloured in pale russet (flight silhouette, photo Y. Fang 2012). – *Merkmale im Schwanzgefieder des Davidskauz': a) Im Schwanzgefieder von Jungvögeln fehlt noch eine deutliche Differenzierung in der Musterung von Mittel- (S. 1) und Außenfedern (S. 2–6; Männchen, etwa 4 Wochen alt). b) und c) Bei einem Großteil der Weibchen stellten wir eine undeutliche Zeichnung aus matten Flecken und Kritzeln an den zentralen Schwanzfedern fest; (d) Präparat aus dem Lian Hua Shan-Museum. e) Im Flugbild dieses Männchens werden die rostroten, einfarbig-ungemusterten Federn der Schwanzmitte deutlich.*

The facial expression of this wood-owl is characterized by a markedly pronounced facial disc, which is framed by a dark rim with contrasting white pearl-spots (Fig. 8-c). During activity, especially in a threatening posture, the facial disc gets spread maximally. Typically, its shape is nearly circular in males, but more broad-oval in females. The fine pearled ruff may be presented actively, to intensify the effect of the white-spotted facial-frame. When highly excited, the owl additionally presents two white half-moon-shaped patches aside the chin, separated by dark feathers below the beak. This impressive pattern is shaped by white flecks on the lower parts of the ruff, the chin and the throat.

The surface of the facial disc is mainly marked by darker radial streaks, especially pronounced beside the eyes (see Fig. 1). But in one individual male and female of the Lian Hua Shan owls, short dotted rows across the radial streaks were perceptible in the lower part of the face, like an inconspicuous fragment of a concentric ring-pattern (Fig. 8-a and -d).

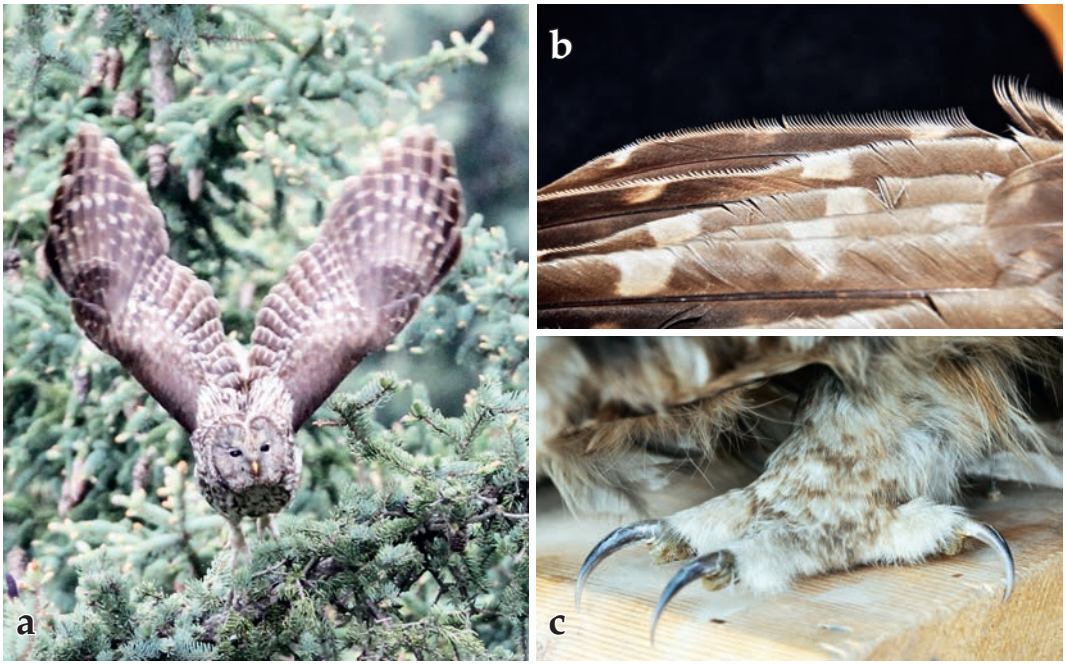


Fig. 6. Characteristics of Pere David's Owls plumage: a) shoulders typically are of plain dark-brown colour (male, photo Y. Fang 2012). b) In addition to the serrated edges on the three outermost primaries, the outer secondaries, and even the "thumb" (alula) show this structures also (female, Lian Hua Shan-Museum; photo W. Scherzinger 2013). c) Tarsi and toes are furry feathered till the talons, the soles are bare only (female, Lian Hua Shan-Museum; photo W. Scherzinger 2013). – *Gefiedermerkmale des Davidskauz': a) Ein ungemustertes Schultergefieder von dunkelbrauner Färbung gilt als typisches Artmerkmal (Männchen). b) Die Zähnelung der drei äußersten Handschwingen setzt sich auch an den äußersten Armdecken, sogar am Daumenfittich fort (Präparat aus dem Lian Hua Shan-Museum). c) Die pelzig-dichte Befiederung von Tarsen und Zehen reicht bis zum Krallenansatz, lässt aber die Sohlen frei (Präparat aus dem Lian Hua Shan-Museum).*

The colour of the dark brown eyes contrasts not only with the pinkish eyelids but also with a light ring, framing the eye like a pair of "half-moons". Black superciliar "eye-shadows" form a border to the whitish, bushy eyebrows, which determine the strong facial expressions. The physiognomic expression may vary by changing the form and size of these eyebrows. Depending on mood, the brows might form a conspicuous V, reaching from the base of the beak (or nostrils), along the inner edge of the eye, up to the dark forehead. When combined with bushy bristles and vibrissae, reaching down to the "cheeks" like a big "A", both structures form a clear X, with the beak in its centre (Fig. 2, and 8-a).

The beak is light to deep yellow ("waxy yellow", in Stresemann 1923). The corners of the beak are flesh-coloured.

Tarsi and toes are densely plumed and furry, with a fine marbling pattern (Fig. 6-c). The strong and long claws are of corneous ochre to grey, progressively darker towards the tips. Stresemann (1923) mentioned a bright yellow colour of the toe-soles.

Flight outlines and plumage patterns. During steered flight, Pere David's Owl uses the broad surface of round wings, forming a large air-foil. The long, rhomboid tail is then fanned broadly (Fig. 9-c). In the flight silhouette, the contrasting

Fig. 7. Draft of variability of colouration of plumage and of patterns on tail-feathers in Pere David's Owl, based on our photo-documents from Lian Hua Shan-Reserve (aquarelle F. Weick, 2013 – unpublished). – *Skizze der Variationsbreite von Gefiederfärbung und Schwanzzeichnung beim Davidskauz, in Anlehnung an unser Fotomaterial aus Lian Hua Shan (F. Weick, 2013, unveröffentlicht).*

bars on primaries and secondaries became distinguishable, showing from below 6 to 7 light bars and light wing-tips and 5 bars plus light wing-tips from above (Fig. 9). Yet in powerful ascents, the primaries are spread to a maximum, so that the single feathers are curved up (Fig. 9-d). In a racy hunting flight, a female rushed several hundred meters in a narrow canyon. Its silhouette resembled an attacking raven or small eagle: the whole plumage depressed for a slim body, the wings angled tightly, and the tail folded closely.

As a characteristic of Pere David's Owl, the plumage on the back appears predominantly unicoloured and dark brown, from mantle to scapulars (Fig. 5-e and 6-a), and from rump to the upper tail-coverts also. The fanned tail shows three crossing bars on the upper side, and four bars on the underside (and light wing-tips in T. 2–6). However, the two central feathers typically lack any conspicuous pattern. In one male, both T. 1 were absolutely plain, and of pale rusty-brown colour; its narrow and attenuated shape differed


a
b
c
d
e
f

Fig. 9. Flight-silhouettes of Pere David's Owl: when a) perching (male) and c) in steered flight (female), the owl uses round wings with nearly closed primaries – like a broad fan. But in powerful ascend, the wing tips become b) spread maximally and d) curved up (male; all photos Y. Fang 2012). – *Flugbilder des Davidskauz': Beim Aufbaumen (a = Männchen) und im Ruderflug (c = Weibchen) werden breit gespreizte Flügel mit fächerartig geschlossenen Schwingen eingesetzt. Bei kräftezehrendem Aufsteilen sind die Handschwingen hingegen maximal gespreizt (b) und in ihrer Spitze sogar einzeln aufgebogen (d), (jeweils Männchen).*

Fig. 8. Characteristics of Pere David's Owl's plumage: a) radial streaks in the facial disc, crossed by tiny concentric dots (male, photo Y. Fang 2012); b) clear radial streaked facial disc (female, photo Y. Fang 2011); c) a rim frames the facial disc distinctly, like a string of pearls (female, photo W. Scherzinger 2012); d) the owl can signalize actively a white V-shaped pattern on forehead (female, photo W. Scherzinger 2012). e) When alert or threatening, the owl may display two contrasting stripes of white pearl-spots at the lower parts of the rim (female, photo W. Scherzinger 2012); f) in full excitement, the owl presents two white "half-moons" beside the chin, and a white X in the face, shaped by bristles and eye-brows (female, photo W. Scherzinger 2012). – *Gefiedermerkmale des Davidskauz': a) im Gesichtsschleier dieses Männchens sind neben den typischen Radialstricheln auch zarte Punktreihen in konzentrischer Anordnung zu erkennen. b) durch Radialstrichel kontrastreich gezeichneter Schleier eines Weibchens. c) Wie ein Perlenkranz wird der äußere Schleier von weißgefleckten Federchen umrahmt (Weibchen); d) die weiße, V-förmige Stirnzeichnung kann aktiv verformt bzw. präsentiert werden (Weibchen). e) Wenn erregt und/oder drohend, verstärkt die Eule die Kontrastwirkung der weißgeperlten Unterkante des Gesichtsschleiers (Weibchen). f) Im Gesicht einer hochgradig erregten Eule werden nicht nur das helle X deutlich, geformt aus Augenbrauen und Vibrissen, sondern zusätzlich zwei weiße „Halbmonde" in Kinnhöhe vorgeschoben (Weibchen).*

from the broader and coarsely barred T. 2–6. Nevertheless, the central tail feathers of some females show fine scribbled lines and spots near the tip, and even an irregular pattern of pale flecks (Fig. 5-b and -c; Fig. 7). Remarkably the central tail-feathers in the mesoptil of fledglings also show a distinct pattern (Fig. 5-a).

Diverging measurements. Measures of body-length, wing and tail are related to only two museum-specimens: data of the type (male; National-Museum Paris) were published by Sharpe (1875), Sharpe and Gunther (1875), and David and Oustalet (1877), recently also by A. Previato (pers. comm., 2014). As the second specimen is also a male (collection of Museum für Tierkunde Dresden), we provide measurements of the bird from Lian Hua Shan Reserve for comparison, as this is probably a female (Tab. 2).

These data show quite diverging results in total length, as Sharpe (1875) stated 20 inches (= 50.8 cm) and David and Oustalet (1877) 0.52 m (each in concern to the type in Paris), but in recent literature the total-length is noted as 54 cm (McKinnon and Phillipps 2000), or even 58–59 cm (f. i. Hartert 1912, del Hoyo et al. 1999, Duncan 2003, König and Weick 2008, Mikkola 2012). A difference of about 7–8 cm begs clarification, as such a mistake

Tab. 2. Due to an irritating range of biometric data of Pere David's Owl in literature, we induced recent re-measurements on the type-specimen (male, National Museum of Paris) and the Dresden-specimen (male, Tierkundemuseum) as well. Especially the data on the total-length show conspicuous discrepancies. In this list we compare also the measures of the specimen of the collection in Lian Hua Shan-Museum, probably a female (all data in cm). – *Trotz aktueller Nachmessungen bleibt die große Schwankungsbreite biometrischer Angaben zum Davidskauz im Schrifttum ungeklärt, wobei sich diese auf nur zwei männliche Individuen beziehen (Typus im Nationalmuseum Paris, Balg im Tierkunde-Museum Dresden). Die größten Differenzen ergeben sich bei den Angaben zur Gesamtlänge. Zum Vergleich werden hier die Maße des – vermutlich weiblichen – Exemplars aus dem Museum im Reservat Lian Hua Shan gegenübergestellt (alle Angaben in cm).*

(Syrnium) ***Strix davidi***	Sharpe 1875	Sharpe & Gunther 1875	David & Oustalet 1877	A. Previato (2014, pers.)	Peters 1940 (fide Weick)	Weick 2006, König & Weick 2008	M. Päckert (2014, pers.)	Scherzinger & Fang (2013)
collection	Paris	Paris	Paris	Paris	Dresden	Dresden	Dresden	Lian Hua-Shan
origin	Moupin	Moupin	Moupin	Moupin	Hwang-lungsze	Hwang-lungsze	Hwang-lungsze	Lian Hua-Shan
sex	♂	♂	♂	♂	♂	♂	♂	? ♀
total length	50,8	50,8	52		52	58–59	? 48–48,5	? 64
wing-length	37,08	37,08	37	35,6–36	37	37,1–37,2	37	38
central tail feathers	26,4	28,98	25	26		26,6	27,5	30,2
outer most feathers			(20)	22,2				26
tarsus	5,33	5,33	5,4			5,3	4	5,5
lower beak								1,6
longest toe								5,8
(claw only)								2,7

Tab. 3. Measures of five eggs of Pere David's Owl, from Lian Hua Shan-Reserve (four new-laid eggs in 2005 and 2010, one embryonated egg in 2012). – *Maßangaben für fünf Eier des Davidskauzes aus dem Reservat Lian Hua Shan (jeweils vier frisch gelegte Eier aus 2005 und 2010, ein hoch bebrütetes Ei aus 2012).*

Broods			measures of eggs – mm			weigth – g	
year	nest site	clutch size	max. length	breadth 1	breadth 2	egg shell	whole egg
2005	box 76	2	49,1	42,2			41,5
2005	box 76		50,1	40,8			42,1
2010	box 72	2	53,0	42,4			52,1
2010	box 72		53,4	42,5			53,2
2012	box 51	2	50,0	41,0	40	4,3	

could only arise from transposed numbers (50.8 cm misrepresented as 58.0 cm?). Ignoring this confusion, Weick (2013) supposed a variation of 51–58 cm to be species-specific in *Strix davidi*.

While measuring the male specimen in Dresden for his "Checklist" (1940), Peters noted "52 cm" on the margin of his listing (Weick F, pers. comm. 2014). A recent verification of the total length of the same specimen by M. Päckert (pers. comm. 2014) resulted in 48.5 cm only. On the one hand this small size is not so different from the original data of 50.8 cm in Sharpe (1875) but on the other hand it differs by at least 14 cm in comparison to the 64 cm of the supposed female from the collection of the Lian Hua Shan-Reserve! (In this context however it should be mentioned, that in both the Dresden and the Lian Hua Shan specimens, precise measurement was not possible because of the mode of preparation). Future measurements on owls caught alive could clarify these uncertainties.

Plumage and measurements of juveniles, measurements of eggs. Between 2005 and 2013, a total of 11 broods were confirmed in the Lian Hua Shan-Reserve. We took measurements of five eggs from three broods (Tab. 3). As typical for members of the genus *Strix*, the eggs are white, with a smooth surface, and spherically round at both poles (Fig. 10-a).

In 2012 we found one egg under nest-box nr. 51, unbroken, containing a dead embryo, and about one week before hatching (the female probably knocked this egg out while bustling from the box due to heavy disturbance). This embryo showed a fully developed downy neoptil on back, femur, and wing (Fig. 10-b). Corneous structures, like bill and claws were distinguishable; the position of toes was 3:1, and not yet 2 and 2 zygodactyls, as is typical for owls.

Due to the intense attendance of parent owls in defence of their breeding site or fledglings by heavy attacks, we abstained from regular controls of nestlings in the boxes, as such interferences are accompanied by heavy stress, up to full exhaustion, especially in adult owls. In consequence descriptions of juvenile plumage are restricted to the 4th and 5th week of nestlings-time, up to fledging.

4th to 5th week of life: Woolly-dense mesoptil, grey with distinct, undulated cross-bars. Eyes dark brown (lens still cloudy), with lilac-pinkish eyelids and a whitish framing. Facial disc of dull brown to pale rufous, darker above the eyes. A light and bushy row of feathers form "eye-brows", inserting above the beak. Vibrissae blackish; on both sides of the beak whitish patches – like a "beard", adjacent to the chin. Beak pale corneous yellow (Fig. 11-a and c). Tarsi with short and furry feathers, uniform greyish-brown. Toes only feathered on upper side (short fluffy down); bare soles of pale yellow colour. Claws corneous grey to blackish.

Over 5 weeks of life: Radial streaks in the facial disc evident (partly patterned by tiny dots in concentric rows; Fig. 11-c). The shape of the facial disc may vary substantially, depending on mood, from a circular dish (curious alertness), to broad heart-shaped face (slackly dozing), and a slender "*burka*-face" (deep sleep; see Fig. 11-b). In contrast to the greyish-pale mesoptil, the facial disc of older nestlings looks darker brown, giving the impression of a "mask", especially from a larger distance (Fig. 11-a and -b). A broad white band expands from the throat up to the chin (Fig. 11-d).

Fig. 10. Eggs of Pere David's Owl are of pure white and have a smooth shell, as is typical for most members of the *Strigidae*-family. a) Clutch with two eggs (Lian Hua Shan, nest box; photo Y. Fang 2011); b) mortified embryo, about one week before hatching (photo W. Scherzinger 2012). – *Wie für den Großteil der Familie* Strigidae *typisch, sind auch die Eier des Davidskauz' reinweiß und glattschalig. a) Gelege mit zwei Eiern (aus Nistkasten; Lian Hua Shan); b) etwa eine Woche vor Schlupf abgestorbener Embryo.*

Tab. 4. Measures of three fledglings of Pere David's Owl, from Lian Hua Shan-Reserve (season 2012). – *Maßangaben von drei eben flüggen Davidskauz-Jungen aus dem Reservat Lian Hua Shan (Brutsaison 2012).*

age about 4 weeks	sex		
	female	male	unknown
weight	550 g	400 g	380 g
total length	32 cm	31 cm	32 cm
wing-length	20 cm	21 cm	18 cm
tail-length	6,7 cm	9,5 cm	60 cm
tarsus	4,6 cm	4,7 cm	4,8 cm
toe + claw	6,2 cm	5,4 cm	5,3 cm
beak	3,6 cm	3,7 cm	3,6 cm
scull-breadth	4,7 cm	4,4 cm	(6 cm)
eye-lid	1,8 cm	1,8 cm	(2,3 cm)

In this age, when the tail-feathers are partly opened from the quills only, no differentiation in pattern is evident between central (T. 1) and lateral feathers (T. 2–6). The beak becomes corneous yellow, the bare soles also. Claws of dark grey. Measurements and weights of three fledglings are shown in Tab. 4.

Discussion

Confusions in literature concerning naming and species-specific characters. As a naturalist-pioneer exploring the species-diversity of mountainous forest in China, Father Armand David collected a large male owl near Moupin/Western Sichuan (today = Baoxing; see Reichenbach 1998; map in Fig. 18) during his second China-Expedition in autumn 1869. David (1871) himself named this bird *Ptynx fuscescens* (believing its

Fig. 11. Mesoptil of Pere David's Owl nestlings and fledglings: The fluffy Mesoptil is of dull greyish colour with fine undulating bars in pale brown. The facial disc mostly is darker, of tawny or rusty-brown colour, and may resemble a "mask" under specific light-conditions. a) – b) Juvenile about 4 weeks old (nest-box; photo W. Scherzinger 2012). c) The facial expression gets defined by dark-brown eyes, framed by pinkie eye-lids and white bordures in the heart-shaped face (about 4 weeks old; photo W. Scherzinger 2012). d) In the fledgling's face strong white eye-brows and white patches on both sides of the bill configure contrasting patterns (about 5 weeks old, photo Y. Fang 2011). – *Mesoptil von Nestling und Ästling des Davidskauz': Das flaumige Mesoptil ist mattgrau, mit feinen, bräunlichen Querwellen. Der meist dunklere, braune oder rötlich-braune Gesichtsschleier wirkt bei bestimmter Beleuchtung maskenhaft. a) und b) Jungvogel am Flugloch eines Nistkastens, etwa vier Wochen alt. c) Im herzförmigen Schleier wird der Gesichtsausruck von den dunkelbraunen Augen bestimmt, eingerahmt durch lila-rosa Lider samt weißer Einfassung (Jungvogel etwa 4 Wochen alt). d) Als weiße Abzeichen sind im Gesicht des Ästlings die kräftigen Augenbrauen, die schmale, weiße Augeneinrahmung und die breiten Felder beiderseits des Schnabels deutlich hervorgehoben (Jungvogel etwa 5 Wochen alt).*

equivalence to *Syrnium fuscescens* from southern Japan, named by Temminck and Schlegel 1947; today = *Strix uralensis fuscescens*); but Verreaux specified this owl as *Ptynx fulvescens* (see also Swinhoe 1871). Sharpe (1875) debunked this misnomer by comparing the Himalayan Wood-Owl (*Syrnium nivicolum* = *Strix nivicola*), collected by David in the same area of Moupin, and a further owl-species, which David had shot in the vicinity of Beijing (named *Syrnium rufescens*). He recognized in the big Moupin-owl a new species and named it *Syrnium davidi*, in validation of David's performance (today = *Strix davidi*, type-specimen in the collection of the National-Museum in Paris; Swinhoe 1871, Hartert 1912).

As we see the matter, several misconceptions may have arisen as a result of the treatment by Sharpe (1875) of *Syrnium davidi*, *Syrnium nivicolum*, and *Syrnium rufescens* together in pressed and multi-clausal sentences. His notice of a contrasting pattern in the facial disc of *Syrnium rufescens*, formed by dark concentric rings (and resembling in this respect the Great Grey Owl, *Syrnium nebulosum*), led to an erroneous attribution of this character to Pere David's Owl. In today's literature these concentric rings have even been identified as specific characteristics of *Strix davidi* (e.g. del Hoyo et al. 1999, Weick 2006, Mikkola 2012). In fact, no mention whatsoever is to be found of such a pattern in the facial disc of Pere David's Owl in

Strix nivicola (ma) *Ptynx fuscescens* *Strix fuscescens* *Strix uralensis nikolskii*

Fig. 12. Due to the incorrect name *Ptynx fuscescens*, the owl portrayed on Plate 2 in David and Oustalet was identified erroneously with the Japanese subspecies of Ural Owl *Strix uralensis fuscescens*. Although the accompanying text describes an individual owl, which Father David collected near Beijing (originated from north-eastern China, and probably identical with *Strix u. nikolskii*), we suggest however, that this image fits better with the Himalayan Wood Owl (*Strix nivicola*). In a consequential mistake, characteristics of this wood-owl might have been transferred to the description of Pere David's Owl, like the concentric rings in the facial disc. (Photo *Strix nivicola* = Quartals 2014; reprint of Plate 2 in David. & Oustalet = http://gallica.bnf.fr/ark:/12148/bpt6k5408615z; reprint of Tabula X in Temminck & Schlegel = http://edb.kulib.kyoto-u.ac.jp/exhibit-e/b05/aves.html; photo *Strix uralensis nikolskii* = Bauer 2014). – *Aufgrund einer falschen Namensgebung auf der Abbildung in David & Oustalet (1877) wurde* Ptynx fuscescens *im späteren Schrifttum irrtümlich mit der japanischen Unterart des Habichtskauzes* Strix uralensis fuscescens *gleichgesetzt. Wir vermuten aber, dass tatsächlich ein Himalaya-Waldkauz (*Strix nivicola*) unter diesem Artnamen abgebildet wurde. Der begleitende Text beschreibt aber einen weiteren Kauz, der aus der Umgebung Pekings stammte, und der vermutlich* Strix uralensis nikolskii, *einem Habichtskauz aus Nordost-China entspricht. Aufgrund solcher Irrtümer dürften Merkmale anderer Eulenarten in die Beschreibung des Davidskauzes eingeflossen sein, wie beispielsweise ein konzentrisches Ringmuster im Gesichtsschleier.*

the pristine, original descriptions (Sharpe 1875, Sharpe and Gunther 1875), nor in the depiction on Plate 3 in David and Oustalet (1877). Confusingly, on Plate 2 of their book on "Birds of China", these latter authors depicted another owl named *Ptynx fuscescens* (the primal name of Pere David's Owl; see Fig. 12), which shows a clear ring-pattern in its face. The corresponding text describes the "Bejing-Owl", mentioned above (identical with *Syrnium rufescens* in Sharpe 1875). Although David explained that this owl may resemble the Ural Owl and has its main area of distribution in Manchuria, the confusion – caused by homonyms and synonyms – incorrectly equated David's *Ptynx fuscescens* with *Strix (uralensis) fuscescens* from the southern islands of Japan (Swinhoe 1871; criticism in Peters 1940, Dekker et al. 2001, Mlikovsky 2012). This misidentification has become established even in recent literature (Zoonomen 2014).

A turbulent confusion has emerged, caused by inconsistent application of names and reinforced by homonyms, with identical names used for different species and even genera, thus hampering the serious identification of individual species (see Tab. 5). On the one hand, A. David (1871) and Swinhoe (1871) used *Ptynx fuscescens* and *Ptynx fulvescens* synonymously for the Pere David's Owl, disregarding the fact that the name *Ptynx fulvescens* was already allocated for the Fulvous Owl of Guatemala (*Strix fulvescens*; equivalent with *Syrnium fulvescens*, in Sclater and Salvin 1882). On the other hand, *Ptynx fuscescens* was also applied by David and Oustalet (1877) to the

Tab. 5. Until the beginning of the 20th century taxonomic denominations lack international reconcilements, so that synonym and homonym names caused confusions. This table takes the examples of Pere David's Owl's historical naming and its closer relatives. – *Noch bis Anfang des 20. Jh. war die Namensvergabe in der Taxonomie nicht international abgestimmt, sodass Synonyme und Homonyme zu ziemlicher Verwirrung führen konnten, wie hier am Beispiel von Davidskauz und enger Verwandter aus der Gattung* Strix *aufgezeigt*.

Strix fulvescens	***Strix davidi***	***Strix nivicola ma ?***	***Strix uralensis fuscescens***	***Strix aluco***	***Otus rufescens***
Syrnium fulvescens	*Ptynx fulvescens*	*Ptynx fulvescens*	*Ptynx fulvescens*	*Syrnium rufescens*	*Strix rufescens*
Ulula fulvescens	*Ptynx fuscescens*	*Ptynx fuscescens*	*Syrnium fulvescens*	*Syrnium stridulum*	*Ephialtes rufescens*
Syrnium nebulosum	*Syrnium davidi*	*Strix aluco ma*	*Ptynx fuscescens*	*Strix stridula*	*Strix mantis*
Syrnium sartorii			*Syrnium fuscescens*	*Aluco stridula*	*Ephialtes mantis*
Strix varia			*Strix fuscescens*	*Strix macrocephala*	*Lempijus mantis*
			Ulula fuscescens	*Strix ululans*	*Otus mantis*
			Syrnium rufescens	*Syrnium aluco*	*Scops mantis*
			Strix rufescens	*Aluco aluco*	
			Strix u. rufescens		
			Strix u. pacifica		
			Strix u. media		
			Strix u. nigra		
Central America	Central-China	southeastern China	southern Japan	Europe, Asia minor	Sumatra, Borneo

"Beijing-Owl" on Plate 2 in their book (Fig. 12), although the original etiquette of the museum-specimen showed the name *Ptynx fulvescens*. Written by hand, this misidentification was corrected as *Syrnium rufescens* (copy in Zoonomen 2014). However, this name had already been allocated twice: firstly for the Reddish Scops Owl from Sumatra (*Strix rufescens*, Horsfield 1822; see Peters 1940; today = *Otus rufescens*), and secondly for the Ural Owl of southern Japan.

Syrnium or *Strix fuscescens* was described by Temminck and Schlegel (1847) as a new subspecies of the Ural Owl (today = *Strix uralensis fuscescens;* see Fig. 12). In Siebold's, "Fauna Japonica – Aves", the authors themselves confusingly used *fuscescens* for the depiction (Plate X) and *rufescens* in the text as a synonym (criticism of inappropriate naming in Dekker et al. 2001, Mlikovsky 2012). In view of the very small and fully isolated area of distribution of this small subspecies, restricted to the southern islands Kyushu, Shikoku, and the southern part of Honshu (Momiyama 1928, Vaurie 1965, König and Weick 2008), a migration from southernmost Japan to the vicinity of Bejing – or even to Manchuria – appears highly doubtful. Hartert (1912) points out similarities of the "Bejing-Owl" with *Strix uralensis hondoensis* from Honshu Island, but also remains sceptical about active dispersal of this small island-owl towards Northern China.

Gurney (1894), Buturlin (1907), and Clark (1911) all criticized the ill-defined naming of these owl species, and speculated which species David had actually shot near Beijing. Gurney suspected the Mountain-Tawny Owl *Strix aluco biddulphi* from South-Eastern Asia as identical with *Syrnium rufescens* in Sharpe (1875) and with *Ptynx fuscescens* in David and Oustalet (1877). However, its distribution may not reach Northern China, and its plumage does not fit with the picture on Plate 2 in David and Oustalet (1877). The distributions of *Strix newarensis (ticehursti*) and *Strix nivicola (ma*) may extend to the Beijing-area or to North Korea respectively (as suggested by Clark). The same could however apply to the northern population of *Strix uralensis.* Momyiama (1928) nominated *Strix u. coreensis* as probably the "Beijing Owl" (distributed in North Korea, southern Manchuria, and Shang-Bay Mountains), or alternatively *Strix u. jingkou* (distributed in south-eastern Manchuria). Both obsolete names have since been subsumed in the subspecies *Strix u. nikolskii*, which occurs in north-eastern China and Sakhalin Island also. Vaurie (1965) recommended this name also for the Ural Owls of North Korea.

As the plumage on breast and belly in the above mentioned picture of *Ptynx fuscescens* in David and Oustalet (1877) shows patterns similar to those of Tawny Owls, Buturlin (1907) rejected an association of the "Beijing Owl" with *Syrnium uralense* from northern China or with *Syrnium (u.) fuscescens* from Japan. Comparisons of body- and wing-measurements of all the subspecies within the genus *Strix* occurring around Beijing, underline the highest degree of conformity of *Ptynx fuscescens* with the eastern subspecies of the Himalayan Wood Owl (*Strix nivicola ma*; see Tab. 6). However the distribution of this bird does not fit with David's remark of a northern origin, especially of Manchuria.

We speculate, that the text and illustration in David and Oustalet (1877) may refer to different owl species. We estimate, that *Strix uralensis nikolskii* hides behind the "Beijing Owl", described in paragraph 70 ibidem. In consequence *Ptynx fuscescens* on Plate 2 may be neither identical with the owl shot near Beijing, nor with the attached description in paragraph 70, and not at all with *Strix uralensis fuscescens* from Japan. Our suggestion identifies *Ptynx fuscescens* with *Strix nivicola (ma*), which species was also collected near Moupin/Sichuan by A. David in 1869 (see Fig. 12).

Adjustments to species-specific characteristics of Pere David's Owl as published in recent literature. Depending on original sources and their interpretation, authors and artists evaluated the published details of Pere David's Owl characters quite differently. In consequence, illustrations in field guides and in the scientific literature not only differ amongst themselves but also from actual impressions in the field. Fig. 13 juxtaposes four examples of recent literature in this concern. Based on a comparison with our observations, experiences, and photographs from the field, a selection of "correct" and "incorrect" but also of missed details should be possible.

Plumage characters. Descriptions and illustrations in recent literature mention concentric patterns as species-specific characteristics in the face of *Strix davidi*. Some authors even discuss a similarity of this pattern with the impressive face of the Great Grey Owl (*Strix nebulosa*). Our investigation has led to the conclusion that this supposed character of *Strix davidi* is a result of erroneous

Tab. 6. Father A. David collected a wood-owl near Beijing, reportedly originated from North-East China or Manchuria. Due to an irritating denomination as *Syrnium rufescens* by Sharpe (1875) and *Ptynx fuscescens* by David and Oustalet (1877), this owl wrongly was equated with *Strix uralensis fuscescens* from the Japanese Islands. By comparing the measures of all owl-species with similar names, we try to clarify, which species factual could come into question as this "Beijing-Owl". We suspect *Strix uralensis nikolskii* behind this species. David & Oustalet (1877) however combined the description of this Ural owl in their book obviously with an illustration of *Strix nivicola (ma)* (which was also collected by David near Moupin). – *Pater A. David sammelte eine große Eule nahe Peking, die aus Nordost-China oder der Mandschurei gestammt haben soll. Aufgrund einer verwirrenden Benennung als* Syrnium rufescens *durch Sharpe (1875) bzw. als* Ptynx fuscescens *in David & Oustalet (1877) wurde dieses Exemplar fälschlicherweise mit* Strix uralensis fuscescens *von den Japanischen Inseln gleichgesetzt. Zur Klärung, welche Eulenart als „Peking-Kauz" infrage käme, seien hier Maßangaben für die Arten mit identischem Namen verglichen. Nach unserer Einschätzung dürfte die Abbildung in David & Oustalet* Strix nivicola ma *darstellen (gesammelt in Moupin), der zugehörige Text sich hingegen auf* Strix uralensis nikolskii *beziehen (gesammelt bei Peking).*

measures in cm	*Strix uralensis fuscescens*		*Ptynx fuscescens*	*Ptynx fuscescens*	*Strix uralensis nikolskii*	*Strix nivicola ma*	*Strix newarensis ticehursti*
distribution	Japan ♂ + ♀	Japan ♂ + ♀	Beijing ♂	E-Sibiria	Mandschuria	SE-China ♂	S-SE-China
total length	45,72		44,00	54,50			
wing-length	29,20–31,10	29,90–33,20	30,00	35,00	29,30–35,00	27,20–29,00	37,70–44,20
wing-span				115,50			
tail-length	20,30–21,60	20,70–23,20	17,00	27,00	20,90–25,40	19,10	
tarsus			5,00				
author	Temminck & Schlegel 1847	Momiyama 1928 Vaurie 1965	David & Oustalet 1877	Taczanowski 1878	Weick 2006	Sharpe 1875 Weick 2006 Mikkola 2012	Weick 2006

interpretation of the description of the type. In his short text, Sharpe (1875) compares *Syrnium davidi* with two other owl species (*Syrnium nivicolum* and *Syrnium rufescens*) to accentuate the specific characteristics of the new species. In this matter he points to the differences in the design of facial-discs, as "*S. rufescens* belongs to the groups of *S. uralense* and *S. nebulosum*, and has, like them, a light-coloured disc, finely irrorated with circular bars of darker brown". However several authors have not only transferred this description to Pere David's Owl but also overemphasized this characteristic in text and illustration (see Fig. 13), although Sharpe underlines the difference clearly: "The Moupin Owl (= *Syrnium davidi*), on the contrary, has a dusky brown and mottled countenance."

The facial expression is portrayed very realistically in McKinnon and Phillipps (2000), with respect to the dark, almond-shaped eyes, and the fine radial streaks in the facial disc. The light frames around the eyes and the contrasting pearl-spotted rim of the facial disc are also correct. But the white corona at the upper rim, which looks

correct	incorrect	reference
radial streaks in facial disc, bushy eye-brows, light framed eyes, perl-spotted rim around facial disc, back-side dark streaked	white coronoid band on upper rim, barred central tail-feathers, broad barred secondaries	MacKinnon & Phillipps 2000

correct	incorrect	reference
white patches beside beak, near chin, black supercilium above eyelids, furry plumage on tarsi and toes back-side dark streaked	strong concentric lines in facial disc, no V-shaped, white pattern on forehead, horizontal lines on breast and belly	König & Weick 2008

correct	incorrect	reference
dark, plain forehead, V-shaped, white pattern on forehead, black supercilium above eyelids, plain centr. tail-feathers, longitudinal stripes on breast and belly, light framed eyes, white row of patches on outer scapulars	faintly spotted rings in facial disc, vibrisses too bushy beside the beak	del Hoyo, Elliot & Sargatal 1999

correct	incorrect	reference
dark, plain forehead, thin horizontal lines on flankes, furry plumage on toes	bow-shaped eye-brows, chequered pattern in facial disc, pale back-side	Eck & Busse 1973

so conspicuous in this illustration, is totally unrealistic. The white chin-patches beside the beak are missing. Even the dark and plain coloration of the central tail-feathers are lacking, one of the most significant character in this species.

In the depiction in König and Weick (2008) the physiognomy is dominated by a marked ring-pattern in the facial disc, which is certainly wrong. The white, contrasting V-pattern on the forehead is missing. But the dark line of the supercilium and the white chin-patches are precisely portrayed. The fine-mottled feathers on tarsi and toes are also shown clearly. Because of the position of the depicted owl the dark central tail-feathers are not visible.

In the water-colour of Quintscher (in Eck and Busse 1973) the pattern of plumage on breast and flanks is depicted clearly, especially the smart shading of longitudinal stripes and transverse lines; also the furry feathers on tarsi and toes. But in the facial disc an overlap of radial streaks and concentric rings causes an almost chequered effect. The facial expression is further alienated by the arching "eye-brows".

Plate 13 in the Handbook of Birds of the World, Vol. 5 (del Hoyo et al. 1999) represents the nearest congruence of illustration and actual appearance of a real owl: a clear contrast between dark forehead and white V-shaped pattern on top of the head, a light framing of the eyes and a dark superciliar-line at the base of the "eye-brows", and also the dark central tail-feathers are clearly portrayed; the distinct row of white patches on the scapulars is also correct. Only the prominent ring-pattern in the facial-disc, the "moustache" of exaggerated vibrissae, and the lack of dense feather-fur on the toes are to be criticized.

Appearance of Pere David's Owl in comparison to *Strix uralensis* and its subspecies. Although Pere David's Owl has been listed recently as a separate species *Strix davidi*, the degree of broad conformity in habit, in proportions of body and feathers of wing and tail, as well as in vocalization clearly indicate a narrow affinity to the Ural Owls (Hartert 1912, Niethammer 1938, Peters 1940, Glutz and Bauer 1980, Scherzinger and Fang 2006; see Tab. 7, 8). By comparing Pere David's Owl with eight currently accepted subspecies of *Strix uralensis* (with respect to plumage characters, including tail and wing measurements; see Fig. 15), we will examine prevalent characteristics, which may be considered species-specific.

Design of facial-disc. A broad facial-disc, with marked dark radial streaks, is equally typical for Ural Owls. Most of the Asiatic subspecies show fine radial streaks; only in *Strix u. fuscescens* are these streaks more rough and massive. However intraspecific variation within *Strix uralensis* also includes concentric ring-patterns (Tab. 8). This phenomenon has already been mentioned by Kohl (1977), who described Ural Owls from Eastern Balkan (Romania, Ukraine). Exceptional individuals from Central Europe may also show such facial patterns (Fig. 14-a). – Cairns (2014) even published a photograph of a Tawny Owl (*Strix aluco*) with strong concentric rings over the whole disc, an absolutely rare variation in this sibling species.

Accentuation of eyes by contrasting patterns. A dark brown iris, framed by slightly bulging eyelids of lilac-pinkish colour, is widespread in the genus *Strix*, being most conspicuous in young

Fig. 13. In view of typical characteristics of Pere David's Owl the corresponding images in literature not only differ among themselves, but also from our field-observations, in single cases even substantially. Comparing four representative examples from recent literature, we point to "correct" and "incorrect" details in the pictures. (Graphs from Eck & Busse 1973, del Hoyo et al. 1999, McKinnon & Phillipps 2000, König & Weick 2008). – *Abbildungen des Davidskauzes im Schrifttum divergieren hinsichtlich der Artmerkmale nicht nur untereinander, sondern auch mit unseren Feldbeobachtungen z. T. erheblich. Anhand von vier Beispielen aus der aktuellen Fachliteratur sei auf „korrekte" und „inkorrekte" Details hingewiesen.*

birds (Fig. 11-c). The two half-moon shaped patches, demarcating the eyes from the facial disc (Fig. 2, 3, 4, and 8), are found in *Strix davidi* and *Strix uralensis* in a more or less similar enhancement of contrast, most notably in the Asiatic subspecies of the Ural Owl (*Strix u. japonica, hondoensis* and *fuscescens*), although rather irregular in the European subspecies. Additionally, in *Strix davidi*

Tab. 7. Due to the perceptible similarities, Pere David's Owl originally was valued as a subspecies of Ural Owl *Strix uralensis davidi*, whereas in literature and taxonomic lists the number of accepted subspecies within this species varies from 2–15. Considering the high degree of isolation of its rather small area of distribution, and in respect to the long period of time, the status of an independent species *Strix davidi* got recommended in recent literature. – *Der Davidskauz wurde aufgrund der großen Ähnlichkeit mit dem Habichtskauz ursprünglich als Unterart* Strix uralensis davidi *gewertet, wobei die Anzahl jeweils anerkannter Unterarten sehr breit von 2–15 variiert. Unter Berücksichtigung der völligen Isolation des relativ kleinen Verbreitungsgebiets über sehr große Zeiträume wird im neueren Schrifttum der Status als eigenständige Art* Strix davidi *als gerechtfertigt gesehen.*

		Strix uralensis		***Strix davidi***
Author	year	number of subspecies	subspecies *davidi*	separat species
Stresemann	1923		*Strix u. davidi*	
Burton	1973	?	*Strix u. davidi*	
The Taxonomicon	2013	3	*Strix u. davidi*	
Wolters	1975	5	*Strix u. davidi*	
Niethammer	1938	10	*Strix u. davidi*	
Vaurie	1965	10	*Strix u. davidi*	
Glutz & Bauer	1980	11–12	*Strix u. davidi*	
ITIS Report, Aves	2013	12	*Strix u. davidi*	
Eck & Busse	1973	13 (14)	*Strix u. davidi*	
Sharpe	1875	?		*Syrn. davidi*
Sibley & Monroe (6)	1996	?		*Strix davidi*
Buturlin	1907	4 (5)		Strix davidi
Hartert	1912	5		Strix davidi
Voous & Cameron	1988	7–8		*Strix davidi*
del Hoyo et al.	1999	8		*Strix davidi*
Weick	2006	8		*Strix davidi*
König & Weick	2008	8		*Strix davidi*
Mikkola	2012	8		*Strix davidi*
Clements Check List Birds (6.8)	2013	8		*Strix davidi*
Internet Bird Collection	2013	8		*Strix davidi*
Boyer & Hume	1991	9		*Strix davidi*
Global Owl Project	2013	9		*Strix davidi*
Peters	1940	10		Strix davidi
Avibirds	2013	10		*Strix davidi*
Zoonomen	2011	10		*Strix davidi*
IOC World Bird List	2013	10		*Strix davidi*
The Owl Pages	2013	10		*Strix davidi*
Wikipedia	2013	15		*Strix davidi*
NCBI Taxonomy	2014			Strix davidi
BirdLife International	2014			Strix davidi
Avibase IOC, World Bird Names	2014			Strix davidi
Taxonomic Hierarchy, China	2014			Strix davidi

Tab. 8. Simplified tabulation of characteristics of Pere David's Owl's plumage, in comparison to typical features in Ural Owls. Due to a broad variability of colours and patterns in Ural Owl's plumage, a high proportion of characteristics, called as species specific for *Strix davidi*, may also occur in single subspecies or colour-morphs of *Strix uralensis*. Therefore the dark-brown and more or less plain central tail-feathers are still the best "ear-mark" to identify the Chinese wood owl (Dark grids = distinct and common; light grids = uncommon and facultative). – *Vereinfachte Auflistung von Gefiedermerkmalen des Davidskauz' im Vergleich zu denen des Habichtskauzes. Aufgrund der großen Variationsbreite von Färbung und Musterung im Gefieder von Habichtskäuzen können selbst Merkmale, die als artspezifisch für* Strix davidi *gelten, bei einzelnen Unterarten oder Farbmorphen von* Strix uralensis *auftreten. Letztlich bleiben die dunkelbraunen, kaum bzw. ungemusterten Federn der Schwanzmitte das sicherste Bestimmungsmerkmal für diesen Kauz aus den Bergwäldern Chinas (Dunkle Kästchen = ausgeprägt und häufig; helle Kästchen = ungewöhnlich und fakultativ).*

		Strix davidi	**Strix uralensis**							
			fuscescens	*hondoensis*	*japonica*	*nikolskii*	*yenisseensis*	*uralensis*	*liturata*	*macroura*
basic colour, breast a. flanks	whitish light									
basic colour, breast a. flanks	off-white									
basic colour, breast a. flanks	light grey									
basic colour, breast a. flanks	greyish brown									
basic colour, breast a. flanks	yellowish brown									
basic colour, breast a. flanks	pale tawny brown									
basic colour, breast a. flanks	dark brown									
eye-brows	V-shaped									
vibrissae	A-shaped									
accentuation of eyes	pinkish eyelids									
plumage on breast and flanks	vertical streakes									
central tail feathers	long and wedged									
shoulder (scapulars)	row of white spots									
accentuation of eyes	white half-moons									
beside the beak	white half-moons									
tarsi and toes	furry plumage									
rim of facial disc	pearl-spotted									
design of facial disc	radial streaks									
white pattern on forehead	V-shaped									
wing (secundaries)	row of white spots									
backside and mantle	dark-brown									
accentuation of eyes	black superciliar									
central tail feathers	plain, unicolour									
backside and mantle	coarse mottled									
plumage on breast and flanks	pale bars across									
plumage on breast and flanks	strong arrowy									
design of facial disc	concentric dots									
central tail feathers	scribbled, patchy									
central tail feathers	markedly barred									
plumage on breast and flanks	thin vertical lines									
tarsi and toes	thin bristled									

Fig. 14. Due to a broad variability in plumage-patterns of Ural Owls, some individuals show characteristics analogous to Pere David's Owl's appearance: a) fine concentric lines in facial disc (*Strix u. macroura*, Southern Austria; photo D. Streitmeier 2009); b) rusty-coloured, undulating bars on breast and belly, across the longitudinal stripes (*Strix u. macroura*, Eastern Slovakia; photo J. Mihok 2008). – *Entsprechend der großen innerartlichen Variationsbreite von Färbung und Musterung des Gefieders von Habichtskäuzen, können Merkmale, die als arttypisch für den Davidskauz gelten, auch bei einzelnen* Strix uralensis-*Individuen auftreten: a) feine konzentrische Punktreihen im Gesichtsschleier (*Strix u. macroura, *südliches Österreich); rostrote Querbänderung in zarter Wellenzeichnung an Brust- und Bauchgefieder (*Strix u. macroura, *Ostslowakei).*

the eyes are accentuated by a thin, black superciliar-line, which also borders the light and bushy eye-brows. This combination produces the "grim scowl", which is also known from European subspecies, but in quite different severity.

Eye-brows and vibrissae. In several owl species a bushy tract of feathered "eye-brows" stretches from the nostrils up to the upper rim of the facial disc, forming a high-angle "V". Continuing the alignment of these V-shaped eye-brows downwards, the brushy vibrissae reach to the lower rim of the facial disc, so forming a broad-angle letter "A". In combination with the "eye-brow-V", the bristles form a whitish X, and when ruffled appear like a "beard" (Fig. 2, 3, 5-c, and 8). Such V- or X-shaped feather-configurations are rather common in the genus *Strix* (and former *Ciccaba*). Therefore, this character appears closely similar in both *Strix davidi* and *Strix uralensis*, but varies greatly according to mood.

The beak of Pere David's Owl is typically yellowish in colour but nevertheless in most owl species the quality of nutrition can change the colour of corneous structures to orange-yellow or even deep orange-red (e. g. by carotene-rich food), or to pale grey (e. g. when mostly preying on small mammals). In young owls, the beak is typically an unremarkable pale-grey.

Rim of facial disc. The distinctive facial-disc of the Pere David's Owl is framed by an outer rim of short, firm, and dark feathers with white spots, forming a contrasting, fringing pearl-line (Fig. 2, 3-b, 4-c, and 8). Such a pattern is also common in Ural Owls but may be less noticeable in subspecies with whitish-light and heavy streaked plumage (e. g. *Strix u. uralensis, yenisseensis, nikolskii*; Tab. 8).

The white "half-moons" on either side of the beak (Fig. 2, 8-e and f) are also rather common in Ural Owls but vary individually, whereby the contrast is lowest in subspecies with a whitish plumage and more conspicuous in darker types. In some individuals, the white patches even show a black framing line, intensifying the contrasting effect of this "mood-barometer". This pattern also occurs in Tawny Owls and Great Grey Owls, and – probably in analogy – Long-eared Owls (*Asio otus*) also, which show such white "half-moons" to a striking effect when excited or threatening (Scherzinger 1986).

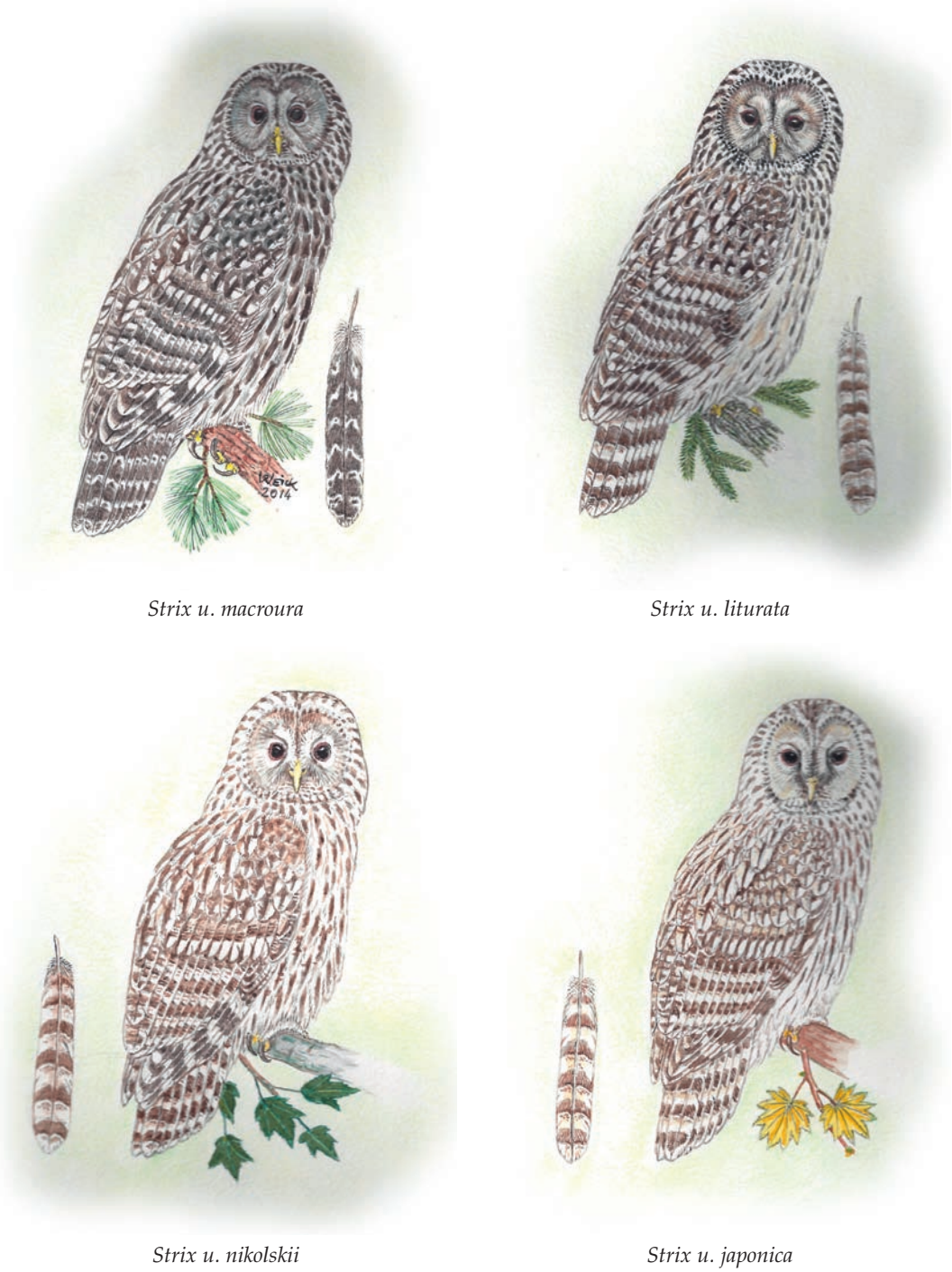
White patterns on forehead and crown. A V-shaped and contrasting pattern of white lines, reaching from the upper rim of the facial-disc over to the dark brown forehead, in some individuals even to the temples of the crown, is typical for most of the representatives of the genus *Strix*. Such a pattern is clearly pronounced in *Strix davidi* (Fig. 2, 3-a, and 8-c), in *Strix aluco* and *Strix albitarsus*; it is still considerable in *Strix occidentalis* and *chacoensis*, but rather weak and with shorter "branches" in *Strix butleri*, *woodfordii*, *varia* and *huhula*. Within the Ural Owls, *Strix u. fuscescens* and *hondoensis* show a V-shaped front-pattern in a distinct form, extending to the lateral head-sides (photo-documents in Myiazaki 1989 and by Jearwattanakanok 2014). In *Strix u. japonica* the "branches" are smaller and therefore less contrasting. In *Strix u. nikolskii* and the European subspecies of *Strix uralensis*, the pattern is largely camouflaged by the high-contrasting and striped head feathers.

Plumage of breast and flanks. In some individuals of Pere David's Owl (e. g. one male and female in the Lian Hua Shan-Reserve) lower parts of breast and flanks show undulating lines, in pale-ochre, across the typical longitudinal stripes (Fig. 3-a). Such a fine pattern (in ochre or rusty-brown colour) is also known from individual Ural Owls, especially of the dark-brown morph in South-Eastern Europe (Fig. 14-b). – In contrast, in East-Asian subspecies the plumage of breast, belly, and flanks is mostly of a light ground-colour, with small and thin stripes, lacking any cross-lines. Due to very tiny stripes, *Strix u. japonica* for instance looks very light, nearly whitish. Nevertheless, single birds show distinguishable cross-bars of light-brown colour (see photo Kushiro Zoo/Hokkaido 2014). A similar impression is presented by the lowest parts of the flanks in *Strix u. hondoensis*, which may show "cross-waves" of mellow-brown. In this respect *Strix u. fuscescens* shows absolutely deviant patterns, with coarse and tapered longitudinal stripes, crossed by distinct, light-brown or even rufous "wave-lines" (Tab. 8). – Quintscher (in Eck and Busse 1973) pointed out similarities of this subspecies (with coarsely-flecked breast-feathers combined with a clearly striped belly) with the Barred Owl (*Strix varia*) of Northern America (with barred upper breast, contrasting with a longitudinally striped belly).

Plumage of tarsi and toes. The plumosity of feet in adult European Ural Owls is nearly identical with that in Pere David's Owl, but some individuals retain a modest cover of bristled feathers only on the toes, as is typical for young birds. Within Ural Owls of Eastern Asia, *Strix u. hondoensis* clearly shows a mottled plumage on its tarsi but nearly bare toes. Similarly, the toes in *Strix u. nikolskii* and *fuscescens* are covered with weak bristles. Only *Strix u. japonica* has a dense, velvety plumage on its toes.

Plumage of rump, mantle and wing coverts. Without question, the overall dark impression of Pere David's Owl, mentioned in the original descriptions, is mainly produced by the blackish-brown and nearly plain plumage tracts on rump, mantle, and "shoulder" (Fig. 4, 5-e, and 6-a). Subspecies of Ural Owl generally lack such dark tracts on rump, mantle and shoulders, with the exception of aberrantly coloured morphs with dark-brown or even blackish plumage ("*Mohren*"= Moors or Negroes; in Kohl 1977, Mikkola 2012).

Due to an incomplete illustration in David and Oustalet (1877), Buturlin (1907) concluded wrongly that *Syrnium davidi* is characterized by a lack of white spots on wing and wing-coverts. In fact a clear row of white drops runs at regular intervals beside the tips of the scapulars in this species. Furthermore, smaller white drops at the tips of the secondary-coverts form a line across the wing (Fig. 3-a, 4-c, and 5-c). Corresponding patterns are shown in specific peculiarity in *Strix u. fuscescens* from Southern Japan: lesser coverts and secondary-coverts of dark mottled chocolate brown, with a broad row of white drops on the tips of the scapulars, highlighted by a conspicuous contrast of colour. Additionally, a smaller row runs across the tips of the secondary-coverts (illustration on Tab. X, in Temminck and Schlegel 1847;



Strix u. macroura *Strix u. liturata*

Strix u. nikolskii *Strix u. japonica*

Fig. 15. Colour-plate of eight accepted subspecies of Ural Owl in more or less identical pose, to ease comparisons of body-size, colour-type, and characteristics of plumage of *Strix uralensis* and *Strix davidi*, considering especially patterns of the central tail-feathers (aquarelle F. Weick, 2014 – unpublished). –

Strix u. uralensis

Strix u. yenisseensis

Strix u. hondoensis

Strix u. fuscescens

Farbtafel mit acht anerkannten Unterarten des Habichtskauzes in mehr/minder identischer Pose, zur besseren Vergleichbarkeit von Körpergröße, Farbtyp und Gefiedermerkmalen von Strix uralensis *und* Strix davidi, *unter besonderer Berücksichtigung der Zeichnung der mittleren Schwanzfedern (F. Weick, 2014 – unveröffentlicht).*

see Fig. 12). Although less prominent, and rather like a small string of white pearls, *Strix hondoensis* possess a similar pattern (see photo in Miyazaki 1989), but possibly not in all individuals. In European Ural Owls, such white patterns on shoulder and wing-coverts are more or less identical to those in Pere David's Owl but may be overlain by a coarse mottling of the wing feathers (Tab. 8).

Tail-feathers. The long and wedge-shaped tail is described as a specific characteristic of Pere David's Owl, whereby the central feathers (T.1) surmount the outer feathers (S.6) by about 4 cm. These central feathers largely are of plain coloration. Although an intraspecific variation in this character might occur (from plain to fine scribbled or irregular flecks; see Fig. 4-a, 5-b and -c, and 7), it is the most useful indicator to distinguish *Strix davidi* from *Strix uralensis* (see Tab. 8). The type-specimen of *Strix u. fuscescens* shows plain-coloured feathers in the middle of its tail, in striking accordance with *Strix davidi* (Temminck and Schlegel 1847, Buturlin 1907, Momiyama 1928), but this is not universal in this subspecies (see Fig. 15). More frequent are pairs of small flecks on the central tail-feathers, as f. i. is typical for *Strix u. hondoensis* (Buturlin 1907, Clark 1907, Miyazaki 1989; illustration in Eck and Busse 1973). In contrast to these exceptions, nearly all subspecies of Ural Owl show coarsely barred tail feathers (T. 1–6; see Tab. 8, Fig. 15).

Colour morphs. Analysis of our photographs from Lian Hua Shan Reserve reveals a variation in plumage colour in the Pere David's Owl, with some individuals showing a lighter ground-colour on back and mantle, with coarse spots and flecks of greyish- or dark-brown, instead of dark-brown and plain feathers (Fig. 4 and 7). The subspecies of *Strix uralensis* from the Japanese Islands, in comparison, follow a gradient of decreasing intensity of colouration from south to north: the plumage of *Strix u. fuscescens* varies from dark rufous to ochre-brown, as its scientific name suggests (Temminck and Schlegel 1847); *Strix u. hondoensis* tends to pale brown, rarely light rusty-brown (Clark 1907, Momiyama 1928, Miyazaki 1989); the ground-colour of *japonica* and *nikolskii* is sometimes light brown but typically light, impure white (Weick 2013; Fig. 15).

Whereas throughout most of its distribution area *Strix uralensis* appears in light brown, pale grey, and even whitish colouration (Tab. 8, Fig. 15), some European populations show an astonishing variability of colour and pattern. Aberrations with dark brown, nearly black plumage were confirmed in the Bohemian Forest for instance, but especially in southern and south-eastern areas of Europe, such as the dark morphs of *Strix uralensis macroura* from the Dinaric Alps, the Western Balkans, and in even greater percentage in the Eastern Carpathians (with a local type *carpathica*), and the mountains of Balkan (Dunajewski 1940, Mosansky 1958, Kohl 1977, Vrezec 2007, Scherzinger 2014; photos in Mikkola 2012). Far remote from this European subspecies, dark morphs have also been observed in Mongolia (Müller J. 2012, pers. comm.). In rare cases reddish to rusty-brown individuals of Ural Owl have even been recorded in Central Europe (e.g. Eastern Slovakia; photo-document by J. Mihok; pers. comm.). This type of colouration is more typical for Tawny Owls, mainly in southern and western populations, and their relatives (e.g. *Strix nivicola*; photo in Mikkola 2012).

The character of plumage colouration is innate, and visible from the mesoptil of early nestlings. It is retained for life and will not change with age to a lighter adult plumage, as Buturlin (1907) erroneously stated.

Comparative measurements of primal feathers. In Fig. 16-a and 16-b minimum and maximum measurements of primaries and tail feathers of Pere David's Owl are compared with corresponding measurements of Ural Owl. Although the number of specimens of *Strix davidi* is very low, the picture shows a clear match with the largest European subspecies where wing- and tail-length are concerned. The wing length of the (presumptive) female from the Lian Hua Shan Reserve is only exceeded by extreme measurements of some *macroura*-birds. The lengths of the central tail-feathers are particularly remarkable, as the *Strix davidi* female even equals *Strix u. macroura*, which is named scientifically for its very long tail.

By arranging each of the subspecies by their species-specific proportions of tail- to wing-length, the Pere David's Owl fits in the cluster of the larger subspecies with predominant boreal distributions (*Strix u. macroura, uralensis, liturata* and *yenisseenis*), in striking separation from the smaller types from Manchuria and the Japanese Islands (*nikolskii, japonica, hondoensis* and *fuscescens*). This holds true for both sexes (Fig.17-a and 17-b).

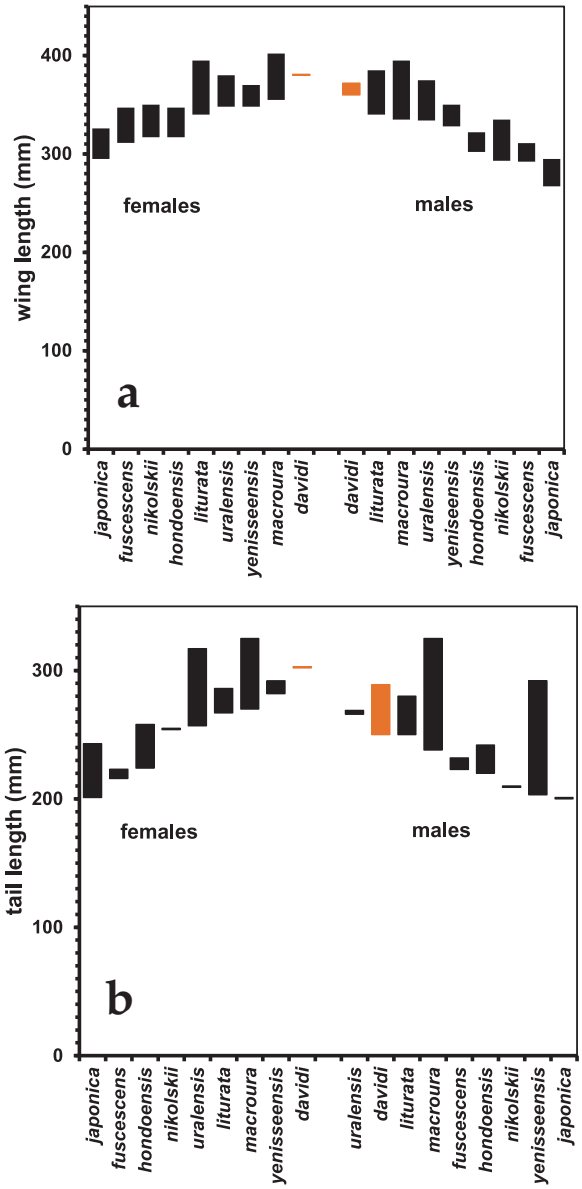


Fig. 16. Minimum- and maximum measures of a) wing-length and b) tail-length of *Strix davidi*, in comparison to eight subspecies of *Strix uralensis*. Pere David's Owl lines up with the biggest subspecies of *Strix uralensis*, what holds true for both sexes (range of values from literature: Meyer & Wolf 1810, Temminck & Schlegel 1847, Schlegel 1862, Sharpe 1875, Sharpe & Gunther 1875, David & Oustalet 1877, Clark 1907, Hartert 1912, Buturlin 1915, Hrabar 1926, Momiyama 1928, Niethammer 1938, Dunajewski 1940, Mosansky 1958, Vaurie 1965, Eck & Busse 1973, Kohl 1977, Glutz v. Blotzheim & Bauer 1980, Mikkola 1983, Bezzel 1985, Pietiäinen 1986, del Hoyo et al. 1999, Duncan 2003, Weick 2006, König & Weick 2008, Mikkola 2012; Weick, 2014 – unpublished; collection of Biologiezentrum Linz/OÖ). – *Minimal- und Maximalmaße von a) Flügellänge und b) Schwanzlänge von* Strix davidi, *im Vergleich zu acht Unterarten von* Strix uralensis. *Der Davidskauz lässt sich – in beiden Geschlechtern – in die Riege der größten Unterarten von* Strix uralensis *einreihen (Variationsbreite nach Literaturangaben).*

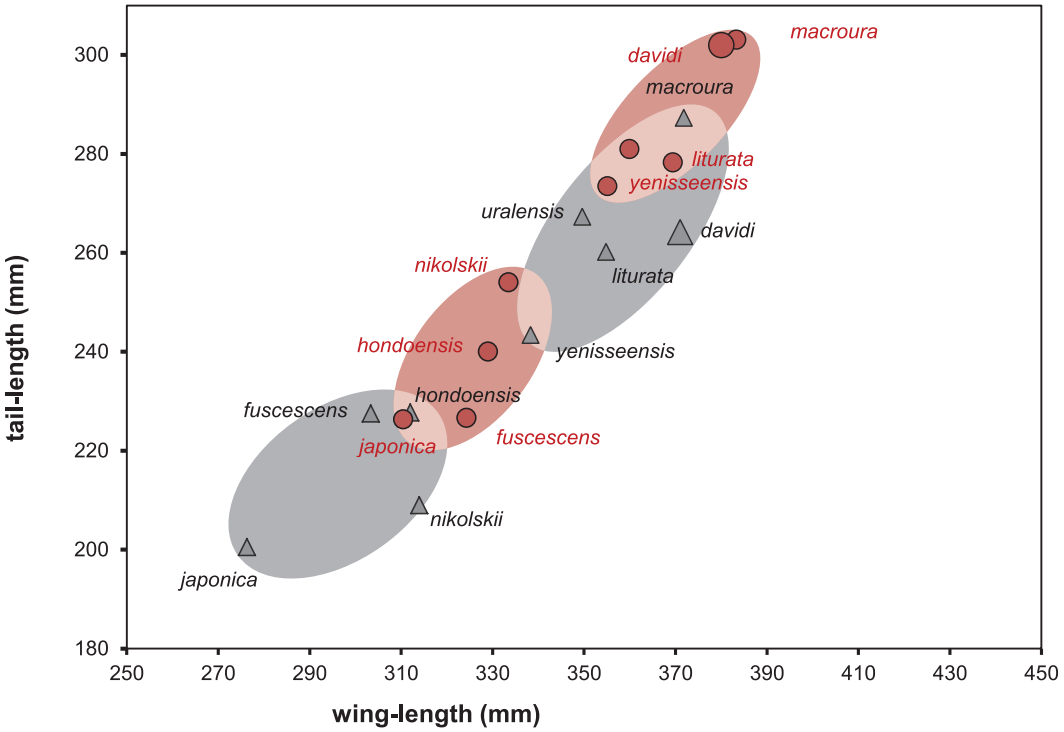


Fig. 17. Proportions of tail- and wing-length of Pere David´s Owl, in comparison with eight subspecies of Ural Owl. *Strix davidi* (big signatures) correlates best with the four big subspecies of *Strix uralensis*, dwelling in the boreal forest-belt. The four obvious smaller subspecies from Eastern Siberia and the Japanese Islands aggregate in a separate cluster (red, dots = females, grey, triangles = males; graph based on data from literature: Meyer & Wolf 1810, Temminck & Schlegel 1847, Schlegel 1862, Sharpe 1875, Sharpe & Gunther 1875, David & Oustalet 1877, Clark 1907, Hartert 1912, Buturlin 1915, Hrabar 1926, Momiyama 1928, Niethammer 1938, Dunajewski 1940, Mosansky 1958, Vaurie 1965, Eck & Busse 1973, Kohl 1977, Glutz v. Blotzheim & Bauer 1980, Mikkola 1983, Bezzel 1985, Pietiäinen 1986, del Hoyo et al. 1999, Duncan 2003, Weick 2006, König & Weick 2008, Mikkola 2012; Weick, 2014 – unpublished; collection of Biologiezentrum Linz/OÖ). – *Proportionen von Schwanz- zu Schwingenlänge des Davidskauzes, im Vergleich zu acht Unterarten des Habichtskauz*'. *Die Maße für* Strix davidi *(große Punkte) sind mit denen der vier großen Unterarten von* Strix uralensis *aus dem borealen Waldgürtel vergleichbar; die vier deutlich kleineren Formen aus Ostsibirien und Japan bilden einen davon deutlich abtrennbaren Cluster (rot, Punkte = Weibchen, grau, Dreiecke = Männchen; nach Literaturangaben).*

Character of mesoptil in young owls. Compared with young Pere David's Owls, fledglings of Ural Owl also show semi-downy feathers in greyish-brown colour, patterned by coarse undulating bars. The same conformity is observable in the white parts on chin and throat, parted by the beak. Young Ural Owls in addition show white patches on the upper eye-lids also, which accentuates the contrast to the eyes with their dark iris. Such white patterns appear peculiarly prominent in fledglings of the dark morphs, but stay rather inconspicuous in birds with light colouration. However, the contrasting dark facial "mask" seems to be unique to *Strix davidi* (resembling in some cases the dark "masked" face of young Long-eared Owls, *Asio otus*; Fig. 11-b).

Closing remarks on a revision of descriptions of the habit and plumage of Pere David's Owl. Statements on appearance, behaviour, and vocali-

zation of Pere David's Owl remained meagre until now, because of the rarity of this species, its limited distribution area in remote forests in high mountains, and its mostly nocturnal activity. Scientific descriptions had been deduced mainly from two museum specimens, collected 140 and 90 years ago (by A. David and H. Weigold) in the woodlands of Sichuan.

In comparison with eight recognized subspecies of Ural Owl from Eurasia (Fig. 15) the lengths of wing and tail of Pere David's Owl correspond with the measurements of *Strix uralensis macroura*, the largest subspecies of the Balkan-countries. Individual plumage characteristics of *Strix davidi* show a high degree of conformity to those of *Strix uralensis*, since the Ural Owl shows extraordinarily broad intraspecific variation, from pale, whitish ground colour of plumage to carbon-brown "moors". The dark, broadly plain central tail feathers and the dark patches on the shoulders remain uniquely characteristic of Pere David's Owl (Tab. 8). An analogous comparison of Pere David's Owl's vocalization with utterances of Ural Owls is in preparation.

Status as a discrete species, justified by separation and isolation

The range of Pere David's Owl is restricted to a few forest districts in the high mountains of Western Sichuan Province and of Southern Gansu Province. (Most records of this rare owl follow a south-north axis from Moupin, Wolong, Jiuzhaigou, Lian Hua Shan; map in Fig. 18. However, only fragments of suitable habitat remain in this area of approximately 10,000 km²). These populations are completely isolated and cut off from the ranges of related Ural Owls by extensive barriers and long distances. Thus the Gobi Desert functions as a barrier from the nearest distribution area of the Daurian Wood Owl (*Strix u. yenisseensis*), in forest areas at the northern border of Mongolia about 2,200 km to the north. Habitats of *Strix u. nikolskii* in the north-east of Inner Mongolia, in Manchuria, and in the forest districts of Northern Korea lie at a minimum distance of about 2,250 km. Kyushu, the area of *Strix u. fuscescens* on the southernmost island of Japan, lies at a distance of 2,800 km (map in Fig. 19;

Fig. 18. Any records of Pere David's Owl's observations are strung along high mountain ridges, following a south-north-directed axis, from Moupin/Baoxing to Wolong, Jiuzhaigou (in Western Sichuan each), to Lianhuashan (in southern Gansu; Google Maps – Lianhuashan Forest-Park, 2014 [https://www.google.de/maps/@47.884621,12.6407084,12z]). – *Alle bisher bekannt gewordenen Beobachtungen des Davidskauz' liegen auf einer Gebirgskette längs einer Süd-Nord-gerichteten Achse, von Moupin/Baoxing über Wolong, Jiuzhaigou (jeweils in West-Sichuan), bis Lian Hua Shan (in Süd-Gansu).*

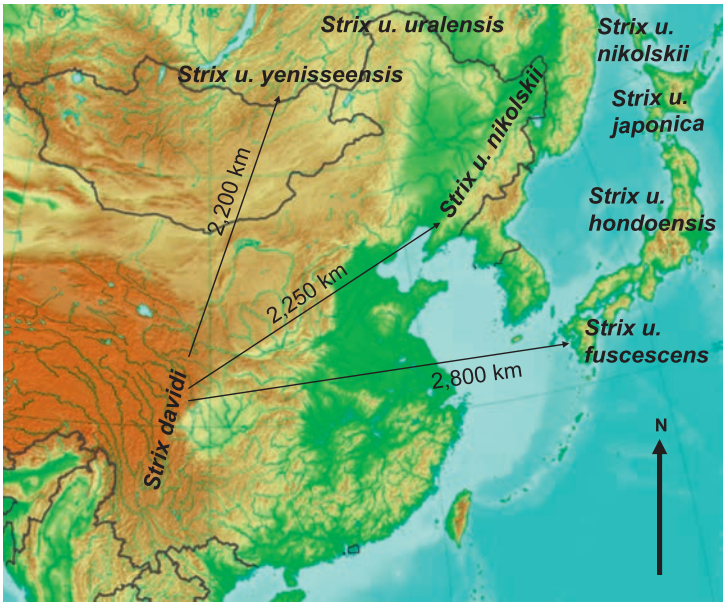


Fig. 19. The distribution-area of Pere David's Owl is cut off from neighboured populations of the Ural Owl over a wide area: distances to *Strix u. yenisseensis*, north of Gobi-desert = 2,200 km; in north-eastern direction to *Strix u. nikolskii* in Korea and Manchuria = 2,250 km; and towards the East = 2,800 km, to *Strix u. fuscescens* on the southern islands of Japan (Wikimedia 2014, East Asia topographic-map [http://commons.wikimedia.org/wiki/File:East_Asia_topographic_map.png]). – *Das Verbreitungsgebiet des Davidskauz' ist von nächstgelegenen Arealen des Habichtskauz' großräumig abgeschnitten: zu* Strix u. yenisseensis *im Norden durch die Wüste Gobi (2.200 km), gegen Nordost 2.250 km zu* Strix u. nikolskii *in Korea und Manschurei, und gegen Ost 2.800 km zu* Strix u. fuscescens *im südlichen Japan.*

Taczanowski 1878, Buturlin 1907, Clark 1907, 1911, Hartert 1912, Momiyama 1928, Vaurie 1965, Weick 2006, König and Weick 2008).

According to a theoretical reconstruction of regional earth history, the Gobi Desert has existed for 1.6 million years (Liu 1994, Zhang 1988). The only remaining potential habitat connection for wood-dwelling owls of the temperate zone in Central China lay in a north-eastward direction (towards modern-day Korea and Manchuria). According to Drovetski (2003), Japan was connected by land-bridges to the mainland of eastern Siberia (via Sakhalin) and to Manchuria (via Korea) during the last glacial period (40,000–30,000 years b. p.). Arising from a pristine type of *Strix uralensis* in this area, the unique *Strix davidi* may have been split by radiation, together with the four contemporary subspecies of Sakhalin (*nikolskii*), Hokkaido (*japonica*), Honshu (*hondoensis*), and Kyushu (*fuscescens*). Within the supposed super-species of big wood-owls, which mainly live in extensive forests of the cooler boreal zone (see Eck 1971), the Pere David's Owl extends the furthest southward (Moupin = 30°, Lian Hua Shan = 34° northern latitude; compared to southernmost distribution of Ural Owls = 32° Kyushu/Japan, and 43° the Balkan Mountains in south-eastern Europe).

With the retreat of temperate forests to higher mountainous elevations during the last post-glacial period, the availability of suitable habitats for Pere David's Owl was extremely reduced. In recent times, this process has been accelerated by the extensive loss of pristine woodland through over-grazing, logging, and uprooting (Klaus et al. 2013).

Because of the obvious similarity with representatives of the Ural Owl (Tab. 8), the Pere David's Owl was at first classed as an isolated subspecies of *Strix uralensis* (overview in Scherzinger and Fang 2006). Although new information is sparse, and in particular comparisons of genetic structure are lacking, the status of *Strix davidi* as a discrete species now appears to be justified. The estimations of taxonomists have changed on account of the extreme limitation of its distribution, to only a few remote forest areas in high mountains, as well as with regard to the very long period of isolation (see Tab. 7). Consequently, Chinese legislation elevated *Strix davidi* into the status of an endemic species of mountainous forests in Central China, and listed this big wood-owl in the highest category of species-conservation. The older recommendation by Eck (1971) to merge *Strix uralensis* and *Strix davidi* as a superspecies seems to fit best with the real conditions of biological relatedness.

Abstract

In autumn of 1869, Father A. David collected several owls in western Sichuan/China. Sharpe (1875) recognized a new species in one of these birds and named it *Syrnium davidi*. Since this time, only very few records and observations had been made, so that even recent publications had to hark back to original descriptions of the type from the Parish National-Museum, more than 100 years old. Because of the deficient quality of these sources, some noticeable discrepancies emerged in descriptions and depictions of Pere David's Owl in the literature, which also conflicted with our experiences and observations in the field.

Following our detection of a small breeding population of Pere David's Owl in Lian Hua Shan Forest Reserve/Province of Gansu, more systematic field-studies of phenotype, of character of plumage, vocalization and breeding behaviour in this rare species became possible. Based on field observations in 1995–2013, protocols on broods in nest-boxes and photo-documents, we not only present a revised species-specific description of *Strix davidi*, but also compare its characters with the related Ural Owl, represented by eight of the currently accepted subspecies of *Strix uralensis*.

Pere David's Owls show measurements of wing- and tail-length more nearly comparable with the largest Ural Owls of south-eastern Europe (*Strix u. macroura*) than with Ural Owls of east Asia (*Strix. u. nikolskii, japonica, hondoensis,* and *fuscescens*), which consistently look smaller and of less strong constitution.

Most characters of adult plumage, which have been published as species-specific for *Strix davidi*, may also occur in certain local types or morphs of Ural Owl. A ring-shaped pattern in the facial-disc, reportedly characteristic of Pere David's Owl, was not found in individuals in the Lian Hua Shan Reserve. We suggest that descriptions of this character in the literature may be based on a confusion with the Himalayan Wood Owl (*Strix nivicola [ma]*), which was collected by A. David in the forests of Moupin/Sichuan at about the same time, and was mentioned by Sharpe (1875) together with the description of the type-specimen.

This confusion became reinforced by ill defined naming, numerous homonyms and synonyms within the genera *Ptynx, Syrnium*, and *Strix*, which were used in parallel at that time. By comparing older illustrations, body measurements and original information on distribution etc., we discuss which owl species was originally collected by David near Beijing, and which species is depicted and described in David and Oustalet (1877), labelled as *Ptynx fuscescens*.

The striking similarities of several details in general behaviour and especially in plumage patterns of Pere David's Owl to those of Ural Owls leave no doubt that these big wood-owls evolved in close relationship. Pere David's Owl was therefore classed as a Chinese subspecies of *Strix uralensis* in the older literature. In recognition of the long period of time that the owl has lived in total isolation in the mountain forests of Central China, the status of a discrete species *Strix davidi* now seems justified.

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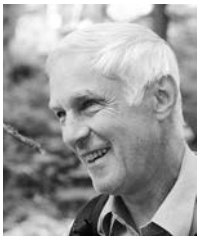


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Appendix – Anhang

Web-addresses for taxonomic lists

Avibase IOC, the world bird database [http://avibase.bsc-eoc.org/species.jsp?avibaseid=7C2108FD7FEE81E8]

Avibirds [http://www.avibirds.com/euhtml/Ural_Owl.html]

BirdLife International [http://www.birdlife.org/datazone/speciesfactsheet.php?id=2247]

Clements Checklist Birds (6.8) [http://www.birds.cornell.edu/clementschecklist/?s=strix+davidi]

Global Owl Project [http://www.globalowlproject.com/species.php?genus=Strix]

IOC World Bird List (4,2) [http://www.worldbirdnames.org/BOW/owls/]

ITIS Report, Aves [http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=686975&print_version=PRT&source=to_print]

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Richmond Index (2014): Error typogr. – non *S. fulvescens – S. fuscescens*. (http://www.zoonomen.net/cit/RI/SP/Ptil/ptil00040a.jpg)

Sibley and Monroe Checklist, Part 6 [http://www.birding.in/checklists/sibley-monroe_checklist_06.htm]

Taxonomy Hierarchy of COL-China, 2012 [http://eol.org/pages/1226113/hierarchy_entries/50282195/overview]

The Internet Bird Collection [http://ibc.lynxeds.com/species/sichuan-owl-strix-davidi]

The Owl Pages [http://www.owlpages.com/gallery.php?section=species&cat=Strix&sub=davidi]

The Taxonomicon [http://taxonomicon.taxonomy.nl/TaxonTree.aspx?id=108099]

Wikipedia [http://en.wikipedia.org/wiki/P%C3%A8re_David's_owl]

Zoonomen [http://www.zoonomen.net/avtax/stri.html]

Web-addresses for graphs and photos

David A, Oustalet E (1877) Reprint of Plate 2 and 3 [http://gallica.bnf.fr/ark:/12148/bpt6k5408615z]

Temminck C-N, Schlegel N (1847) Reprint of Tabula X [http://edb.kulib.kyoto-u.ac.jp/exhibit-e/b05/aves.html]

Cairns P (2014) Photo of *Strix aluco:* [http://www.arkive.org/tawny-owl/strix-aluco/image-A23401.html]

Quartals P (2014) Photo of *Strix nivicola:* [http://www.google.de/imgres?imgurl=http://i77.photobucket.com/albums/j63/cettia/P1580612_corr.jpg&imgrefurl=http://cettia.livejournal.com/240377.html&h=567&w=425&tbnid=0Q33vaiv_r5xoM:&zoom=1&tbnh=90&tbnw=67&usg=__BwK4-SS1RI-GSgd7TyBvU8926lw=&docid=YsV0e6cQLzefmM&sa=X&ei=okC9U_2zGfTL4QSstIDoCQ&ved=0CCUQ9QEwAQ&dur=3033]

Bauer M (2014) Photo of *Strix uralensis nikolskii*: [http://www.google.de/imgres?imgurl=http%3A%2F%2Forientalbirdimages.org%2Fimages%2Fdata%2Fural_owl_1.jpg&imgrefurl=http%3A%2F%2Forientalbirdimages.org%2Fsearch.php%3FBird_ID%3D613%26Bird_Image_ID%3D78367%26p%3D2&h=600&w=495&tbnid=SWBeRYhOoyk9QM%3A&zoom=1&docid=20Vd2F6WhXRcfM&itg=1&ei=HTq9U9TXEIKL7AaS24CgCQ&tbm=isch&iact=rc&uact=3&dur=2491&page=1&start=0&ndsp=16&ved=0CC4QrQMwBA

Jearwattanakanok A (2014) Photo of *Strix uralensis fuscescens:* http://orientalbirdimages.org/search.php?Bird_ID=613&Bird_Image_ID=55621&p=8

satonbin.photo-web.cc/ezofukurou.htm

http://ibc.lynxeds.com/photo/ural-owl-strix

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Tab. 9. Comparison of measures of Pere David's Owl and eight subspecies of Ural Owl (mean values from literature; sources of specifications: Meyer & Wolf 1810, Temminck & Schlegel 1847, Schlegel 1862, Sharpe 1875, Sharpe & Gunther 1875, David & Oustalet 1877, Clark 1907, Hartert 1912, Buturlin 1915, Hrabar 1926, Momiyama 1928, Niethammer 1938, Dunajewski 1940, Mosansky 1958, Vaurie 1965, Eck & Busse 1973, Kohl 1977, Glutz v. Blotzheim & Bauer 1980, Mikkola 1983, Bezzel 1985, Pietiäinen 1986, del Hoyo et al. 1999, Duncan 2003, Weick 2006, König & Weick 2008, Mikkola 2012; Weick, 2014 – unpublished; collection of Biologiezentrum Linz/OÖ). – *Wesentliche Körper- und Gefiedermaße des Davidskauz', im Vergleich zu denen von acht Unterarten des Habichtskauzes (Angaben aus dem Schrifttum gemittelt).*

Strix uralensis ♀	**weight (g)**	**total length**	**wing (mm)**	**tail (mm)**	**tarsus (mm)**
macroura	917,6	597,5	383,3	303,1	
liturata	901,5	580,0	369,4	278,3	56
uralensis	950	563,05	359,9	281	58,5
yenisseensis		560	355,1	273,5	56
Strix davidi (♀?)		**600?**	**380**	**302**	**56**
nikolskii	719	540	333,5	254	
hondoensis		520	329	240	50
fuscescens		500	324,3	226,6	51
japonica		500	310,5	226,3	
Strix uralensis ♂					
macroura	709	570,75	372,8	287,3	
liturata	662	540	354,8	260,2	50
uralensis	620	540	349,6	267,3	
Strix davidi ♂		**580?**	**371**	**264,2**	**53**
yenisseensis		540	338,3	243,4	56
nikolskii	630	500	314	209	
hondoensis		400	312	227,7	44
fuscescens		457,2	303,4	227,5	51
japonica			276,3	200,5	