unterschiede in Kolumbien bekräftigen die Forderung, der westandinen Population einen eigenständigen taxonomischen Status zuzubilligen. Damit wäre *P. g. emiliae* valide. Gestützt wird diese Ansicht durch das disjunkte Verbreitungsgebiet der westandinen (*emiliae*) und nordwestlichen (*coruscus*) Populationen (HINKELMANN 1988).

Literatur

CHAPMAN, F. M. (1917): The distribution of bird-life in Colombia. A contribution to a biological survey of South America. Bull. Amer. Mus. Nat. Hist. 36: 1–729.

GRISCOM, L. (1929): A collection of birds from Cana, Darien. Bull. Mus. Comp. Zool. 69: 147–190.

HARGER, M., & D. LYON (1980): Further observations of lek behaviour of the Green Hermit Hummingbird (*Phaethornis guy*) at Monteverde, Costa Rica. Ibis 122: 525–530. • HINKELMANN, C. (1988): Taxonomie, geographische Variation und Biogeographie der Gattung *Phaethornis* (Aves Trochilidae). Inaugural-Disseration, Rhein. Friedrich-Wilhelms-Universität, Bonn.

PETERS, J. L. (1945): Check-list of birds of the world. 5. Bd., Cambridge, Mass.

SNOW, B. K. (1974): Lek behaviour and breeding of Guy's Hermit Hummingbird *Phaethornis guy*. Ibis 116: 278–297. • Dies. (1977): Comparison of the leks of Guy's Hermit Hummingbird *Phaethornis guy* in Costa Rica and Trinidad. Ibis 119: 211–214.

SZTOLCMAN, J. (1926): Rewizja ptaków neotropikalnych w zbiorach Polskiego Pánstwowego Muzeum Przyrodniczego. Prace Zool. Polsk. Panstw. Muz. Przyrodn. 5: 197–235.

TODD, W. E. C. (1942): List of the hummingbirds in the collection of the Carnegie Museum. Ann. Carnegie Mus. 29: 271–370.

ZIMMER, J. T. (1950): Studies of Peruvian birds No. 55. The hummingbird genera *Doryfera*, *Glaucis*, *Threnetes*, and *Phaethornis*. Amer. Mus. Novit. 1449.

Why do Female Blue Tits (*Parus caeruleus*) Bring Fresh Plants to their Nests?

Jerzy Banbura, Jacques Blondel, Hilde de Wilde-Lambrechts, Philippe Perret

BANBURA, J., J. BLONDEL, J., H. DE WILDE-LAMBRECHTS & Ph. PERRET (1994): Why do female Blue Tits (*Parus caeruleus*) bring fresh plants to their nests? J. Orn. 136: 217–221. — Females of the Blue Tit were observed to bring plant materials to their nests on Corsica. The timing of the visits with green moss and leaves, late evening, suggests that their most probable function is the insulation of the nest. Another likely function is the protection against parasites and pathogens.

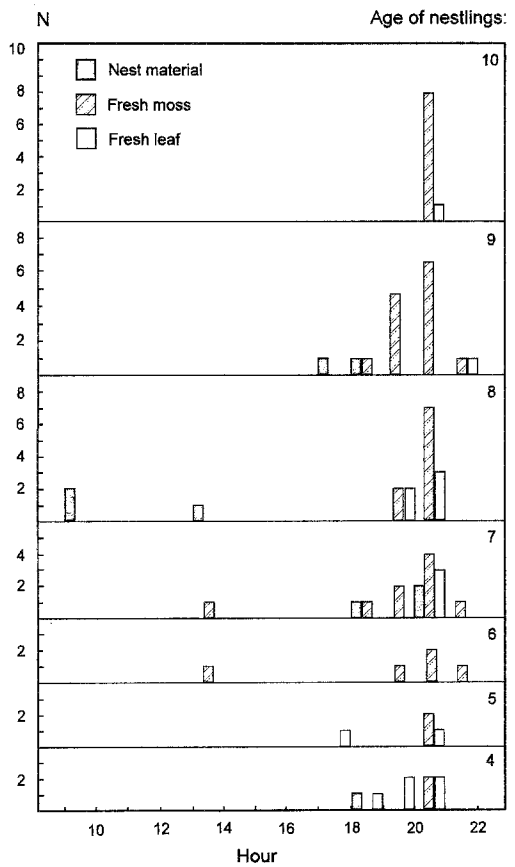
Centre d'Ecologie Fonctionnelle et Evolutive, CNRS, B.P. 5051, 34033 Montpellier cedex, France; (J. B.) Department of Ecology and Vertebrate Zoology, University of Lodz, Banacha 12/16, 90-237 Lodz, Poland

At least six hypotheses explain functionally why adult birds bring green plants or plant parts to their nests containing eggs or nestlings (WIMBERGER 1984, CLARK 1991). These hypotheses are: (1) the aesthetic hypothesis, (2) the crypsis hypothesis, (3) the water loss hypothesis, (4)

the shading hypothesis, (5) the nest insulation hypothesis and (6) the nest protection hypothesis (CLARK 1991). Only the hypotheses (3), (5) and (6) make sense in hole nesting species like the Blue Tit *Parus caeruleus*.

The water loss hypothesis suggests that fresh plant material contributes to keeping a certain level of humidity in the nest, which is very important for eggs and, perhaps, for nestlings, especially in warm and dry environments. Plants brought to the nest should obviously be able to store some water in their tissues or on the surface and to release it afterwards. The nest insulation hypothesis states that plant material may be used to prevent too much heat to get out or into the nest and it is presumed that the plants used have good insulating properties (MERTENS 1977). Carrying out repairs of the nest seems also to be a form of its insulating. Finally, the nest protection hypothesis suggests that birds bring to their nests plants that contain secondary compounds which protect offspring against parasites and pathogens. An obvious assumption is that plants used are rich in relevant substances.

Here we present some new data concerning plant materials and the timing of their bringing to the nests of the Blue Tit. They will be discussed in the context of the above hypotheses. An earlier study on the same species was interpreted in favour of the nest protection hypothesis (COWIE & HINSLEY 1988).



The time distribution of the number of a female's visits with nesting materials, fresh moss and fresh leaves on seven subsequent days. Age of nestlings is given.

Material and Methods

We observed Blue Tits bringing plant materials to the nests while studying the diet of the nestlings on Corsica (42 ° 23' N, 08 ° 45' E) in June 1987 and in June 1989. The study site was located in an evergreen forest dominated by the Holm Oak *Quercus ilex*. Photographs of adult birds coming to nestboxes to feed young were taken. Specially designed nestboxes equipped with 8 mm cameras and flashes were used. An electronic watch was photographed together with the birds. We studied 10 nests, 5 in each year. The pictures were then inspected at a natural scale. More than 7500 visits were recorded.

Besides various prey items, we were able to distinguish three categories of materials brought to the nests: dry nesting material (dry grass, moss and small branches), fresh green moss and fresh leaves or their parts.

We wish to thank M. LAMBRECHTS and P. DIAS for helpful advice, M. SON for data management, M. MAISTRE for work in the field and M. PRZYBYLSKI for his help with the figure. J. BANBURA would like to greatly acknowledge receiving from the Ministére de la Recherche et de la Technologie, France, of a fellowship for his stay in Montpellier. He would also like to especially thank M. LAMBRECHTS for his generous help during the stay.

Results

Adult birds bringing green moss or leaves were observed in 9 out of 10 nests (the two-tailed binomial test P = 0.0215; cf. ZAR 1984). Only the females brought non-food materials (P = 0.0039).

In one nestbox which was observed most extensively, the female most often brought non-food material in the evening, usually on the last several visits, and only on single occasions was she observed doing so in the morning or around noon (Fig.). The most frequent plant material was moss. Visits with dry nesting materials and green leaves were less frequent. The former were recorded even in the morning, while the latter exclusively in the evening. It was not possible to identify the leaves with certainty because they were incomplete — usually only torn pieces were brought. They seemed to be leaf fragments of the Holm Oak.

Discussion

GIBB (1950) and RHEINWALD (1972) observed Blue Tits bringing green plant material to nests and COWIE & HINSLEY (1988) classified moss as well as dry grass and feathers as nesting materials and found that the timing of visits with this kind of materials differed significantly from the timing of visits with green herbaceous leaves. They suggested that this behaviour could be predicted from a version of the nest protection hypothesis which could be called the female protection hypothesis. They thought that females protected themselves against parasites by bringing plants containing biologically active substances to the nest just before roosting.

In the present study we also found that a female returned with both moss and green leaves mostly in the evening. Although this could support COWIE & HINSLEY's (1988) idea of female self-protection, this behaviour also supports the general version of the nest protection hypothesis because nestlings gain protection against parasites in this way as well.

On the other hand, the observed timing pattern does not give much support to the water loss hypothesis, in spite of a possibility of water shortage in this dry and warm Corsican habitat (BLONDEL et al. 1991). If water loss were the main reason for bringing plants to the nest, we would expect most visits to occur in the early morning, after dew appears.

The timing of the relevant visits may suggest that a major reason for bringing plants to nests is connected in one way or another with what happens at night. It is possible that nests need mending and additional insulation in the evening when the activity of both adult birds and chicks stops. The activity during the day certainly causes some damage in the nest construction. So the simplest explanation seems to be that at least the moss is incorporated into Tit nests as a very good insulator (MERTENS 1977). For Blue Tits living in Corsica, this may in fact be a remnant of a more elaborate ancestral insulation behaviour. In our study site, mean daily temperature was 18.9 ° C in June 1987 and 20.7 ° C in June 1989, with minimum temperature on any particular day being 8 ° C and 10.9 ° C, respectively, and mean day maximums were 25 ° C in both years. So there still are some day-night contrasts in temperature.

This of course does not rule out the possibility that two mechanisms work in concert. As it was emphasized by CLARK and coworkers (1991, 1985, 1987), all green plants contain secondary compounds that can be used against parasites. Moreover, we do not think that the parts of leaves we observed can be a useful insulation material and their antiparasitic function seems more probable. Furthermore, the parasitic load in Blue Tits on Corsica is very high. The blood-sucking larvae of *Protocalliphora* were observed to be very harmful, especially at the end of the breeding season when temperature is high (BLONDEL unpubl.).

Therefore a further step in this study will be to (1) compare the extent of the development of plant material bringing behaviour between this Corsican population and a much less parasitized mainland population, (2) investigate whether there is a variation between nests in the rate of bringing plant material in relation to the parasitic load, and (3) investigate whether birds select plants that contain high concentration of secondary compounds.

Zusammenfassung

In Korsika wurden Blaumeisen beobachtet, die Pflanzenmaterial in ihre Bruthöhlen eintrugen. Grünes Moos und frische Blätter wurden am späten Abend eingetragen. Dies läßt vermuten, daß das Pflanzenamterial der Thermoisolation diente. Eine weitere wahrscheinliche Funktion wird im Schutz gegen Parasiten und Krankheitserreger gesehen.

Literature

BLONDEL, J., A. DERVIEUX, M. MAISTRE & Ph. PERRET (1991): Feeding ecology and life history variation of the Blue Tit in Mediterranean deciduous and sclerophyllous habitats. Oecologia 88: 9—14.

CLARK, L. (1991): The nest protection hypothesis: the adaptive use of plant secondary compounds by European starlings. In: J. E. LOYE & M. ZUK, Bird—Parasite Interactions—Ecology, Evolution and Behaviour: 205—221. Oxford. • Ditto (1985): Use of nest material as insecticidal and antipathogenic agents by European starling. Oecologia 67: 169—176. • CLARK, L. & J. R. MASON (1988): Effect of biologically active plants used as nest material and the derived benefit to starling nestlings. Oecologia 77: 174—180. • COWIE, R. J., & S. A. HINSLEY (1988): Timing of return with green vegetation by nesting Blue Tits *Parus caeruleus*. Ibis 130: 553—555.

GIBB, J. A. (1950): The breeding biology of the Great and Blue Titmice. Ibis 92: 507—539.

MERTENS, J. A. L. (1977): Thermal conditions for successful breeding in Great Tits (*Parus major* L.). II. Thermal properties of nests and nestboxes and their implications for range of temperature tolerance of Great Tit broods. Oecologia 28: 31—56.

RHEINWALD, G. (1972): Blaumeise (*Parus caeruleus*) dekoriert ihr Nest mit Blättern von Brennesseln (*Urtica dioica*). Orn. Mitt 24: 47.

WIMBERGER, P. H. (1984): The use of green plant material in bird nests to avoid ectoparasites. Auk 101: 615—618.

ZAR, J. H. (1984): Biostatistical Analysis. Englewood Cliffs.

Ein Fall von Vogelpocken bei den Großtrappen (*Otis tarda*) im österreichischen Teil des Hanság

Anton Stefan Reiter und Gerhard Loupal

REITER, A. S., & LOUPAL, G. (1995): A case of "pox" in the Great Bustard (*Otis tarda*) of the Hanság population in Austria. J. orn. 136, 1995: 221—223. — In July 1992, in the Austrian part of Hanság, a seventy day old young bustard was found dead in a grassland. On the left intertarsal joint a walnut sized open pock was located. Other pocks reaching pea-size were found on both legs. The diagnosis "pox" was established by light- and electron-microscopic examination of the lesions. A further chick of another hen, fledged in the same year, observed from a distance showed abnormal thickening of the intertarsal joint area. The consequences of "pox" for such a small group of Great Bustards (total for 1988—1993 15—20 birds) should be watched carefully.

(A. S. R.) Institut für Zoologie, Universität für Bodenkultur, Gregor Mendel-Straße 33, A-1180 Wien; (G. L.) Institut für Pathologie und Gerichtliche Veterinärmedizin, Veterinärmedizinische Universität, Linke Bahngasse 11, A-1030 Wien.

Vogelpocken sind bei zahlreichen Vogelarten beschrieben worden (LOUPAL, SCHÖNBAUER & JAHN 1985). Über Pocken bei Großtrappen liegt eine Mitteilung aus dem Zoo in Bukarest vor (COCIU et al. 1972). Unseres Wissens ist über Vogelpocken bei freilebenden Großtrappen bislang nicht berichtet worden.

Das Untersuchungsgebiet ist der ca. 7000 ha große österreichische Teil des Hanság. Beobachtet wurden vom 10. April 1988 bis 1. April 1994. In den sechs Sommerhalbjahren (jeweils 1. April—30. September) wurden insgesamt 6060 Stunden, in den Winterhalbjahren insgesamt 760 Stunden für die Feldarbeit aufgewendet.

3jähriges Forschungsprojekt BC 7i der Arbeitsgemeinschaft-Gesamtkonzept-Neusiedlersee (AGN), Projektträger Österreichischer Naturschutzbund — Landesgruppe Burgenland sowie anschließende Betreuung im Auftrag des WWF-Österreich, des Inst. für Zool. der Universität für Bodenkultur/Wien und des Nationalparkes Neusiedler See — Seewinkel.

Der Brutzeitbestand der Großtrappe im österreichischen Teil des Hanság schwankte 1988—1993 zwischen 15 und 20 Individuen. Ein ad. Hahn und zwei Hennen waren gehbehindert und deshalb individuell erkennbar. Eine weitere Henne wurde an einer Verdickung (möglicherweise zwei Hautknoten) am rechten Lauf knapp unterhalb des Fußwurzelgelenkes seit dem 2. August 1989 in jeder folgenden Brutperiode wiedererkannt und kontinuierlich beob-