Occurrence of strange objects in nests of the Wryneck *Jynx torquilla*

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A study was made of the contents of 41 nest-boxes of the Wryneck; the sample localities cover the Finnish range of the species fairly well. The samples included various objects brought to the nests by the Wrynecks, the majority with no nutritional value — pieces of glass, porcelain, plastic, bones, metal, egg shell fragments, shells and fragments of bivalves and terrestrial snails, stones, etc. It is concluded that to find many of them the birds had to visit unusual feeding sites, and that in some cases they had shifted to novel food items, possibly owing to a temporary food shortage. The only feature common to these objects and ants, the normal food of the Wryneck, seems to be their shiny surface.

The presence of strange objects did not appear to affect the number of nestlings per brood, but the frequency of broods with one or more dead nestlings was higher in the group of nests containing such objects. Fourteen dead nestlings were dissected, and four of them (29 %) had stones or a piece of glass in their stomachs. Possible reasons for the occurrence of strange objects in the nests are discussed.

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Introduction

Throughout its range the Wryneck is an extreme food specialist. Its diet consists mainly of ants and ant cocoons, but other insects, spiders and slugs, and even Lupine seeds *(Lupinus luteus)* may occasionally be taken (PUHLMANN 1914, BUSSMANN 1941, STEINFATT 1941, DURANGO 1942, SZÖCS 1942, DEMENTEV et al. 1951, STEIL 1957, KÖNIG 1961, v. HAARTMAN et al. 1963—72 and RUGE 1971). In Norway (HAFTORN 1971:486) and in Finland (TERHIVUO 1976), Wrynecks have been reported to carry terrestrial snails to the nestlings. In Germany and Denmark pieces of glass and plastic fed to nestlings have increased nestling mortality (CHRISTENSEN 1975). TERHIVUO (1976) suggested that these are parallel examples of the same tendency. To study this phenomenon further in Finland, I asked ornithologists to save the material left in the nest-boxes of Wrynecks after the breeding period.

Material and methods

Altogether 20 samples with notes on the breeding result of the pairs were received and these were examined together with earlier data on the nesting success and nest-box contents of 21 pairs studied by Mr. T. Leino (locality 11 below). The 17 sample localities (Fig. 1) and the breeding schedules of

the pairs studied are described below. Data on nestling mortality is given later in this paper.

1. Valkeakoski, Kärsä (679:34, Grid 27°E, see HEIKINHEIMO & RAATIKAINEN 1971); a sparse, dry, mixed forest. The nest-box was emptied in autumn 1975. In spring 1976 it was first occupied by Great Tits (no eggs), but by 29 May, 3 eggs had been laid by the Wryneck. These were destroyed by man. On 19 June, 9 Wryneck eggs; on 9 July, 6 nestlings.

2. Svartå, Andersro (667:32); a yard. The nest-box was emptied in spring 1976.

3. Kyröskoski (684:29); vicinity of human settlement. The nest-box was not emptied before the nesting in 1975.

4. Riihilahti, Kalkkinen (680:42); a yard. The nest-box was set out in spring 1975, but evidently not used until 1976.

5. Iitti, Säyhtee (676:45); a dry coniferous forest near a field. The nest-box, not emptied earlier, was inhabited by the Wryneck in both 1975 and 1976. 7 nestlings were ringed on 2 July 1976.

6. Tuustaipale, Saviniemi (682:48); a yard. The nest-box was inhabited by Great Tits in 1975, but not emptied after that. The Wryneck nested in 1976 and an unknown number of young fledged on about 6—8 July.

7. Nilsiä, Etelä-Reittiö, Tarpinen (701:54); vicinity of human settlement. The nest-box was set out in spring 1976. On 25 June, 9 nestlings, which all fledged in July.

8. Harjunpää (683:22); unknown habitat. The nest-box was emptied in autumn 1975. In spring 1976 it was occupied by Great Tits (no eggs), and later by the Wryneck. 4 juveniles fledged on about 7 July.

9. Saarinen (700:48); a garden surrounded by fields. No nesting in 1975. In spring 1976 the nest-box was first inhabited by Great Tits (no eggs), and later by the Wryneck. On 21 June, 9 nestlings.

10. Hietasilta, Pilkanmaa (675:47); a yard. The nest-box was set out in 1976. An unknown number of young fledged on about 9 July.

11. Ylämaa, Leino (674:55). *A.* A sparse, mixed forest near a garden. The nest-box was set out in spring 1965 and emptied in spring 1966. By 9 July, 9 young fledged. *B.* A garden. The box was set out in spring 1966 and emptied in spring 1967. On 5 June 1967, 11 eggs; by 10 July, 10 young fledged. The nest-box was emptied in March 1968. On 7 June 1968, 10 eggs; by 10 June, 7 juveniles hatched, and by 10 July, 6 of them fledged. In 1973 the Wryneck nested again. *C.* A hill with mixed forest, about 500 m from human settlement. The box was emptied in winter 1968. On 15 June 1968, 9 eggs; by 26 July, an unknown number of juveniles fledged. *D.* A hill with mixed forest, about 500 m from human settlement. The box was emptied in spring 1971. On 10 June 1971, 10 eggs; on 23 June, 9 nestlings. *E.* Centre of a village, the nest tree surrounded by bushes. The nest-box was emptied in spring 1976. On 12 June 1976, 8 eggs; on 2 July, 3 nestlings. *F.* A hill slope near a field; the nest in a cavity in a rowan stump.

12. Korso, Nisbacka (669:39); vicinity of human settlement. The material was collected from 1—3 nest-boxes of the Wryneck in 1969. Other data lacking (see TERHIVUO 1976).

13. Askainen, Lempisaari (672:21); a sparse forest near human settlement. An unknown number of live nestlings.

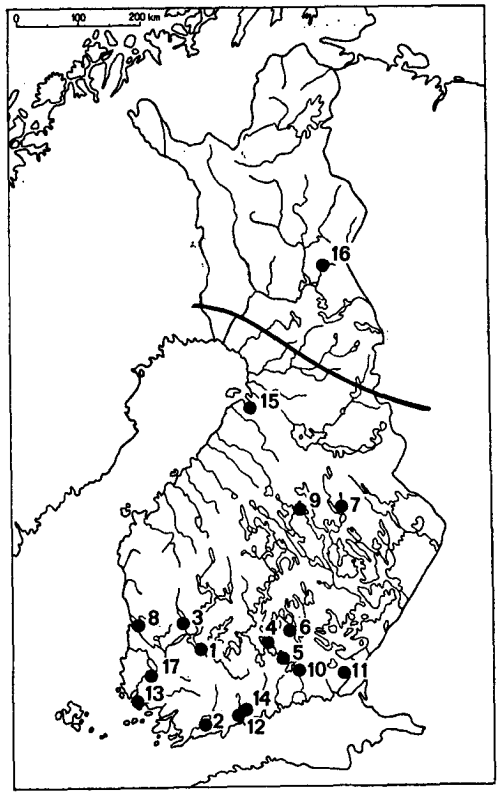

FIG. 1. Sample localities. Black line = northern limit of the regular breeding range of the Wryneck in Finland according to v. HAARTMAN et al. (1963—72).

14. Vantaa, Silvola (668:38); unknown habitat. The box was first inhabited by Pied Flycatchers. On 18 June 1976, 10 eggs of the Wryneck; by 13 July, 8 young fledged.
15. Liminka, Virkkula (719:41); unknown habitat. The box was emptied in 1975, 8 juveniles fledged in July 1976.
16. Salla, Kursu (740:55); unknown habitat. On 24 June 1976, 10 nestlings and two unhatched eggs. This record is north of the usual breeding range of the species in Finland.
17. Yläne, Vaskijärvi (675:24); two nest-boxes in a mixed forest, no nesting in 1975. *A.* On 6 June 1976, 7 eggs; on 27 June, 5 nestlings. *B.* On 2 July 1976, 10 eggs; on 15 July, 8 live and 1 dead nestlings.

Results and discussion

The excrements among the material sampled consisted almost entirely of the chitinous parts of ants *(Formica, Lasius* spp.) mixed with dead plant material and small stones (diameter $\leq$ 1 mm), which were evidently taken with the ants. Only a few fragments of Coleoptera and Hemiptera were found, which indicates that the Wryneck is an extreme food specialist in Finland as well.

The Wrynecks had also carried a great number of strange objects to their nests (Table 1). The wide range of the sample localities (Fig. 1) suggests that this is not an unusual or local phenomenon in Finland, at least in 1976. Moreover, as far as is known, the material collected is unbiassed. The pieces of glass, porcelain, metal, plastic, bones, fishbones and fish scales, aluminium foil and stones may have been picked up from trash heaps, yards and roadsides. Many objects probably come from poultry farms such as the fragments of exotic marine bivalves (mostly *Cardium* spp.; imports used in poultry farming) and the fragments of egg shells (distinctly thicker than those of the Wryneck, most probably from the domestic hen). The shells and shell fragments of Finnish bivalves had been picked up from shores. It can thus be concluded that the birds have visited unusual feeding sites. The shells of the biggest terrestrial snails had been broken to extract the soft parts; this food item had been particularly favoured at locality 13. Except for the snails, the objects found were of no nutritional value to the nestlings.

Most of the objects were found in the loose material left in the nest-boxes, not in the excrements. Thus in most cases either the nestlings were not fed with the objects or they had been rejected by them. In fact, many objects were too big to be swallowed even by an adult bird.

Altogether 14 dead nestlings (from localities 1, 8, 10, 13 and 17B) were dissected. One dead nestling from locality 8 had three stones (6×5, 6×5 and 5×3 mm) in its stomach and another had a piece of brown glass (7×5 mm) and one stone (6×4 mm). One of the four dead nestlings from locality 10 had swallowed a stone (4×3 mm), and two stones (5×3 and 4×3 mm) were found in the stomach of the smallest of the three dead nestlings from locality 17B. Since the Wrynecks do not carry any nest material, the tendency to take objects to the nest seems to be related to the feeding of nestlings.

It can be assumed that the parent birds are driven to search for food by their inner motivation (physiological state) and stimuli from the hungry nestlings, and that their subsequent behaviour is triggered by stimuli from the food items, probably mostly visual. FEARE (1967) reported that in times of frost Song Thrushes *Turdus philomelos* feed on Dogwhelks *Thais lapillus* (Mollusca), on the shore, and according to HARTLEY (1953) and GIBB (1954), during cold periods tits *Parus* spp. may feed in other parts of the trees than

TABLE 1. The number of nestlings produced in relation to the objects found in the nests of the Wryneck. Symbols: I = pieces of glass or porcelain, II = stones (max. diameter ≧ 5 mm), III = shells and shell fragments of terrestrial snails, IV = shells or shell fragments of bivalves, V = egg-shell fragments (those of Wrynecks excluded), VI = fishbones and fishscales, VII = mammalian bones and bone fragments, VIII = pieces of metal, IX = pieces of aluminium foil, X = pieces of plastic, XI = seed of a leguminous plant. Sample volume in dl.

Locality	and year	Sample volume (dl)	Nestlings Alive	Nestlings Dead	Objects found I	II	III	IV	V	VI	VII	VIII	IX	X	XI
1	1976	3.0	0	6	—	2	1[a]	—	—	—	—	—	—	—	—
2	1976	0.5	+	0	—	—	—	—	9[b]	1	—	—	—	—	—
3	1975	0.1	+	0	—	—	—	—	—	—	—	—	—	—	—
4	1976	0.3	+	0	—	2	8[a]	1[c]	11[b]	2	—	—	—	—	—
5	1975—76	1.5	7	0	8	—	—	—	6[b]	—	1[d]	—	—	—	—
6	1976	0.8	+	0	3	5	—	—	20[b]	—	—	—	3	—	—
7	1976	2.5	9	0	4	—	1[e]	—	34[b]	—	—	—	—	—	—
8	1976	0.6	4	3	2+2[f]	16+2[f]	—	—	—	—	—	—	—	—	—
9	1976	3.0	0	9	—	—	—	—	—	4	—	—	—	—	—
10	1976	3.0	+	4	1	1[f]	—	—	1[b]	—	—	—	—	—	—
11A	1965	?	9	0	+[g]	—	—	—	—	—	—	—	—	—	—
11B	1966	?	8	1	—	—	—	—	—	—	—	—	—	—	—
11B	1967	?	10	0	+	—	—	—	—	—	—	—	—	—	—
11B	1968	?	6	1	125	—	—	27[c]	—	—	—	—	—	—	—
11B	1973	?	10	0	—	—	—	—	—	—	—	—	—	—	—
11C	1968	?	9	0	—	—	—	—	+[b]	—	—	—	—	—	—
11D	1971	?	9	0	—	—	—	—	—	—	—	—	—	—	—
11E	1976	0.3	3	0	6	19	—	92[c]	—	—	—	1[h]	—	—	—
11F	1976	0.3	+	0	7	—	—	—	28[b]	—	—	—	—	—	—
12	1976	0.1	?	?	—	—	16[i]	—	7[b]	—	—	—	—	—	—
13	1976	3.0	+	1	—	—	122[j]	5[k]	—	3	—	—	—	—	—
14	1976	3.0	8	0	3	—	—	6[l]	—	—	—	—	—	—	—
15	1976	3.0	8	1	65	6	—	—	2[b]	2	7	3[m]	—	26	—
16	1976	0.5	10	0	—	3	—	—	4[b]	—	31[n]	—	—	—	—
17A	1976	5.0[o]	5	0	—	36	—	—	—	—	—	—	—	—	—
17B	1976	17.5[o]	6	3	—	8+2[f]	—	—	—	—	—	—	—	—	1

a = from *Bradybaena fruticum* (1 ex.), b = from eggs of the domestic hen, c = from exotic species, mostly *Cardium*, d = humerus of the Mole *Talpa europaea*, e = unbroken shell of *Cochlicopa lubrica*, f = found in the stomach(s) of dead nestling(s), g = a great number of pieces, h = bullet of an airgun, i = from *Bradybaena fruticum* (1 ex.), *Trichia hispida* (6 exx.), *Cochlicopa lubrica* (2 exx.) and *Nesovitrea hammonis* (1 ex.), j = from *B. fruticum* (about 36 exx.), k = shells of *Mytilus edulis* (1 ex.) and *Mya arenaria* (3—4 exx.), l = from Finnish freshwater spp. (*Unio* vel *Anodonta*), m = bullet of an airgun and two pieces of a paste tube, n = small pieces of big bones and right half of mandible of the Root Vole *Microtus oeconomus*, o = including moss and wadding put by man in the bottom.

usual. The Wryneck may also change its diet if ants are scarce (v. HAARTMAN et al. 1963—72), and the present material indicates that the birds had visited places where ants are not usually observed. Accordingly, I suggest, as a working hypothesis, that if food is scarce during unfavourable periods e.g. on cold and rainy days, the birds tend to visit new feeding places and perhaps use new food items.

The nestlings need a large daily supply of food (see BUSSMANN 1941, RUGE 1971), and during periods of poor weather it may be especially difficult for a monophagous bird like the Wryneck to find enough food. Only one of the 14 nestlings dissected had a

TABLE 2. Nesting success of the Wrynecks studied. The nests are divided into two groups, A. Nests without objects and B. Nests with objects.

Locality and year	Nestlings Alive	Dead	Total
A. Nests without objects			
11/1965	7	0	7
11/1966	8	1	9
11/1967	8	0	8
11/1967	5	0	5
11/1968	7	0	7
11/1970	9	0	9
11/1971	7	0	7
11/1971	12	0	12
11/1971	9	0	9
11/1972	9	0	9
11/1972	6	0	6
11/1972	5	0	5
11/1973	10	0	10
11/1974	9	0	9
11/1974	10	0	10
11/1975	10	0	10
3/1975	+	0	?
B. Nests with objects			
11/1965	9	0	9
11/1967	10	0	10
11/1968	6	1	7
11/1968	9	0	9
11/1971	9	0	9
5/1975—76	7	0	7
1/1976	0	6	6
2/1976	+	0	?
4/1976	+	0	?
5/1976	7	0	7
6/1976	+	0	?
7/1976	9	0	9
8/1976	4	3	7
9/1976	0	9	9
10/1976	+	4	?
11/1976	3	0	3
11/1976	+	0	?
13/1976	+	1	?
14/1976	8	0	8
15/1976	8	1	9
16/1976	10	0	10
17/1976	5	0	5
17/1976	6	3	9

full stomach (all three nestlings from locality 10 had empty stomachs).

Most animals do not respond to many characteristics of a situation but only to a few essential sign stimuli, and only to a few of them at a time (TINBERGEN 1951). What resemblance have all these objects to ants, the normal food of the Wryneck? The objects vary in colour: white (porcelain, bones, stones), green (pieces of glass), yellow and brown of different shades (pieces of glass, snails, stones), dark blue (shells of *Mytilus),* silver (aluminium foil), lead grey (bullets of an airgun) transparent (pieces of glass). The colour of ants also varies: red and brown *(Formica),* yellow and black *(Lasius).* The shape and the size of the objects seem to lack importance; there were triangular, quadrangular, ± elongated, thin and thick pieces of glass, porcelain, etc., and e.g. the pieces of glass measured from 45×15 mm to 2—3 mm, but most of the objects were bigger than ants or ant cocoons. The only character common to the objects and ants seems to be the more or less shiny surface.

In normal situations, the stimuli of the objects may not be strong enough to have any effect, but if the innate motivation of the bird is high enough, they may elicit some reaction, viz. picking up. DELIUS (1968) has pointed out that hunger and thirst shift the colour preference of pigeons. The possibility that the objects always have more effective (supernormal) stimuli than normal food is not supported by the present material, but it cannot be completely ruled out without further study. However, in habitats with permanent human influence there are so many small, shiny objects available that selection should operate effectively against their continuous preference to normal food.

Feeding is a complicated process, in which learning plays an important role, not only affecting the development of feeding behaviour and the selection of the sites where the bird searches for

food, but also largely determining the nature of the effective stimuli (see HINDE 1973:506—8). The possible role of learning in the present case is unknown.

CHRISTENSEN (1975) reported that the Wrynecks carrying pieces of plastic, glass, etc. to their nests suffered from high nestling mortality. Table 2 gives data on the presence of abnormal objects in the nests and the nesting success in the present material. In the nests without such objects (group A), the number of nestlings per brood was 8.25 $\pm$0.49 *(S.E.)*, and in the nests with abnormal objects (group B), the number was slightly lower, 7.82$\pm$0.46. However, the difference is not statistically significant (*t* test, $P = 0.53$). The number of nestlings fledged per brood was apparently higher in A than in B, 8.19 $\pm$0.48 vs. 6.47$\pm$0.77 (*t* test, $P<0.1$). The frequency of broods with dead nestlings is 1/17 in A and 8/23 in B, the difference being statistically significant (Fisher's exact test, $P = 0.04$). Only 4 (29 %) of the 14 dead nestlings dissected could have been killed directly by the objects found in their stomachs.

The tendency to carry strange objects to the nests should be studied further in Finland and other countries. Although this tendency seems to be common in Finland (at least in 1976) the rather comprehensive literature on the breeding biology of the Wryneck in Central Europe hardly contains any note of it. It is thus possible that the tendency is more common in peripheral populations, or that it has arisen only recently.

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Selostus: **Käenpiian tavasta kantaa esineitä pesäänsä**

Tutkituista käenpiian pesänäytteistä (taul. 1) löytyi lukuisia erilaisia ravinnoksi kelpaamattomia esineitä: lasin- ja posliininpalasia (sarake I), kiviä (II), simpukankuoria ja kuorirouhetta (IV), kananmunan kuoren kappaleita (V), kalojen luita ja suomuja (VI), nisäkkäiden luunsiruja ja luita (VII), metalliesineitä kuten ilmakiväärin luoteja (VIII), alumiinipaperia (IX), muovikelmun palasia (X), hernekasvin siemeniä (XI) sekä maakotiloiden kuoria (III), joista pehmeät osat oli käytetty ravinnoksi. Löytöpaikkojen sijoittuminen eri puolille Suomea (kuva 1) osoittaa, että kyseessä ei ole paikallinen ilmiö. Koska näytteet pyydettiin lähettämään ilman minkäänlaista valintaa, ilmiö oli ainakin v. 1976 tavallinen. Koska aikaisemmat kirjallisuustiedot tavasta ovat niukat, vaikka lajin pesimäbiologiaa on melkoisesti tutkittu, ilmiö voi olla Suomessa tavallisempi kuin esim. Keski-Euroopassa.

Käenpiian ravintona ovat normaalisti lähes yksinomaan muurahaiset ja niiden kotelot ("muurahaisenmunat"). Ravintopulan sattuessa monet lintulajit hakeutuvat uusiin ympäristöihin ja/tai siirtyvät uusien ravintokohteiden käyttöön. Ehkä hetkellinen ravinnon niukkuus (esim. sadepäivinä) ja toisaalta ravinnon jatkuva suuri tarve pesäpoikasten ruokkimiseksi on aiheuttanut muutoksia käenpiikaemojenkin ravinnonhaussa. Ilmeisesti ne ovat löytäneet esineitä mm. kanatarhoista (simpukkarouhe, kananmunien kappaleet), rannoilta (kotimaisten simpukoiden kuoret), tunkioilta (luunsirut, kalojen luut ja suomut, lasinpalaset) ym. paikoista, joista ne eivät tavallisesti etsi ruokaansa. Rikotut maakotilot, joista pehmeät osat oli syöty, osoittavat lintujen osittain muuttaneen myös ravintokohdetta.

Yleensä linnut eivät reagoi kaikkiin ympäristön ärsykkeisiin, vaan ainoastaan ns. avainärsykkeisiin. Ainoa yhtäläisyys löydettyjen esineiden ja lajin normaalin ravinnon välillä on näiden enemmän tai vähemmän kiiltävä pinta. Käenpiiat eivät ehkä normaalisti reagoi lainkaan tai vain harvoin ko. esineiden aiheuttamiin ärsykkeisiin, ts. nämä ovat suboptimaalisia. Jos ravintoa on niukasti, saattaa linnun viretilassa (motivaatiossa) tapahtua muutos, jolloin se reagoi moniin kiiltäviin esineisiin. Vähemmän todennäköistä on, että kiiltävät esineet aiheuttaisivat jatkuvasti voimakkaampia (supernormaaleja) ärsykkeitä kuin normaali ravinto. Esimerkiksi kulttuuriympäristössä, joista lähes kaikki näytteet ovat, kiiltäviä lasin- ja posliininpalasia, pikkukiviä ym. on yleensä niin runsaasti, että jos

emot suosivat niitä jatkuvasti normaaliravinnon kustannuksella, laji häviäisi näiltä alueilta nopeasti kokonaan. Oppimisen mahdollista osuutta tutkittuun ilmiöön ei ole voitu päätellä.

Taulukossa 2 on esitetty käenpiikojen pesimätulos (ryhmä A = pesissä ei esineitä, B = pesissä oli esineitä). Keskimääräinen kokonaispoikasmäärä paria kohden ei riipu merkitsevästi esineiden esiintymisestä pesissä. Pesyeitä, joissa oli kuolleita poikasia, oli tilastollisesti merkitsevästi useammin ryhmän B emoilla. Näillä myös elävien pesäpoikasten määrä paria kohden oli, joskin tilastollisesti vain suuntaa-antavasti, pienempi kuin ryhmässä A. Koska useimmat esineet löytyivät pesäainesten joukosta eivätkä ulosteista, emot eivät aina olleet tarjonneet esineitä poikasilleen tai poikaset eivät olleet pystyneet niitä nielemään. Kuolleita pesäpoikasia voitiin tutkia 5 eri pesästä 14 yksilöä; neljällä (29 %) oli kiviä tai lasinpalanen mahassaan. Muiden kuolema on ehkä aiheutunut ravinnon niukkuudesta (mahat yhtä lukuunottamatta miltei tyhjät).

Jatkotutkimuksia varten kirjoittaja pyytää pesänäytteitä (myös kuolleet poikaset mukaan) ja mahdollisimman yksityiskohtaisia pesimätietoja kesäkaudelta 1977. Jotta ilmiön yleisyyttä voitaisiin luotettavasti arvioida, *jokainen käenpiian pesä sisällöstä riippumatta tulisi lähettää.*

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