# A NESTING STUDY OF THE BRONZED GRACKLE

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DESPITE its abundance and accessibility for study, the Bronzed Grackle, *Quiscalus quiscula versicolor*, is poorly represented in the literature. The following material on the reproductive activities of this species was obtained during the spring periods of 1947 and 1948 at Ho-Nee-Um Pond, a small portion of the University of Wisconsin Arboretum, at the outskirts of Madison, Wisconsin, and in 1949 at Vilas Park, Madison. Searches made about twice a week insured finding a high percentage of the nests, and the histories of most of these were closely followed. The period included in the study each year extended from the third week of March through the second week of June. About 75 man-hours were spent in the field each year.

The Ho-Nee-Um Pond Area is a low-lying, five-acre park on the northwest shore of Lake Wingra with several irregular plantings of closely spaced arbor vitae, *Thuja occidentalis*, in which the grackles nested. Vilas Park is at the northern end of Lake Wingra, about one mile from Ho-Nee-Um. The nesting cover used here consisted mainly of honeysuckle shrubs, *Lonicera tartarica*.

## PRE-NESTING OBSERVATIONS

The first grackles arrived in the third week of March in all years, the males preceding the females by about a week. During the pre-nesting period there was considerable movement by the birds. They were usually seen in small groups of both sexes, spending much time perched in tall trees and flying about in and near the nesting areas. In early April, grackles color-banded at Ho-Nee-Um were seen one mile northwest, one mile southwest, one mile northeast, and on the opposite shore of Lake Wingra, about a mile and a half east. The wide ranging habits of the grackle have been previously described by Laskey (1940: 29) who raised a nestling. It was once captured two and one-half miles north of its foster home, and a few days later was caught a mile or more southeast of its home, to which it subsequently returned.

Courtship started with the arrival of the females about the last week in March. The courtship took place in the trees, the males lifting and spreading their tail feathers, and emitting three or four *'clucks,'* followed by a rasping *'skreeek.'* Most courtship performances observed were group projects, that is four or five males displaying to one female. In 1947 a female carrying nest material was still escorted by several males.

On April 5, 1949, a pair of grackles was observed courting in an elm tree one block from the Ho-Nee-Um Pond Area. The male repeatedly picked up and moved a bit of paper with his bill, replacing it in a crude nest consisting of a few twigs in a crotch about 25 feet above the ground. He frequently lifted his wings, spread his tail, and '*skreeeked.*' The female, perched about a yard away, also held a scrap of paper in her bill, but she remained more quiet than the male. Twice the female flew at the male, but he remained at the nest. The performance lasted about five minutes until both birds flew, the male to a nearby spruce tree and the female farther and out of sight. Two weeks later, when other nests were nearing completion, this nest was noted to have increased in bulk, but to be loosely built. It never was completed or contained eggs.

During the early part of nest building each year, numerous nests were found which were deserted in a beginning stage of construction. The courtship activity observed in 1949 suggests that these may have been nests built by courting males.

Forbush (1927: 458) described the males as fighting fiercely for the females and stated that when a nesting colony has been established there are frequent battles. No such behavior was observed during this study. The group maintained flocking habits during the entire breeding cycle, and though occasional fights were seen, the chases were very desultory, and as a rule the birds were extremely peaceable.

The question arises as to whether the indications of polyandry are due to an excess of males in the population. Snyder (1937: 39) recorded the sex ratio of 204 Bronzed Grackles trapped in Ontario during late March and found 48.5 per cent males and 51.5 per cent females. However, Trautman (1940: 391) noted a predominance of males among early transient grackles. Of 94 birds trapped in Madison during the spring seasons of 1947-48-49, and sexed by plumage characters, 55 (58.5 per cent) were males. No significance is attached to this small sample because of possibilities of differential trapability and of error in sexing.

Further samples of sex ratios are needed, as well as field observations on marked birds, before a clear understanding of the mating habits of this species can be gained. Unfortunately the grackles were very adept at removing color bands, which greatly hampered certain aspects of the study.

Considerable variation was noticed in the trapped birds, especially in the males, as to size, stoutness of the bill, and thickness and roughness of the tarsus. A careful study might show these to be acceptable age criteria. Two females had deep brown irises instead of the usual

pale yellow, and one female had an eye in which the iris was partly brown and partly yellow.

## NESTING ACTIVITIES

The earliest nests were started in the first week of April. Most nests had been started by the last week of April (Fig. 1). Among nests which eventually received eggs, four general stages of nest building were recognized: 1) platform (flat, no cup); 2) half complete (sides built up, no lining); 3) nearly complete (mud lining); and 4) complete (soft grass lining, no eggs). There was considerable variation in the length of time used in nest building. Several nests were started at least 16 days before the first egg was laid, and one nest was known to have been built in four days. The average length of each stage of nest building in the two seasons at Ho-Nee-Um Pond is shown in Table 1. Nests found in advanced stages of construction were dated on the basis of these averages each year. For example, a nest which was half complete when first found on April 10, 1948, was considered to have been started five days earlier, on April 5. The dates used in Figure 1 (except before April 29 in 1949) were determined mainly by direct observation, but partly by this method of estimation.

TABLE 1

LENGTH OF NEST BUILDING IN DAYS (BRONZED GRACKLE)

| *Stage* | *1947* | | *1948* | |
|---|---|---|---|---|
| | *Average* | *Extremes* | *Average* | *Extremes* |
| Platform to half complete | 2 | 1 and 4 | 5 | 1 and 8 |
| Half complete to nearly complete | 3 | 0 and 7 | 3 | 1 and 9 |
| Nearly complete to complete | 2 | 0 and 4 | 3 | 1 and 6 |
| Complete to first egg | 4 | 0 and 14 | 3 | 0 and 11 |
| TOTAL | 11 | 4 and 16 | 14 | 4 and 16 |

At Ho-Nee-Um, all of the nests were located in arbor vitae. Little preference for edge was shown, the grackles building indiscriminately in the border trees or in the middle of the plantings. Nest trees varied in height from 9 to 23 feet with an average of 12 feet. Aside from the obvious limitations there appeared to be no correlation between tree height and nest height.

Most of the nests were suspended between two or more upright trunks several inches apart; the rest were fixed in lateral branches or in deep crotches. Vines, coarse grasses, and bits of paper were used for the platform, suspending loops, and sides of the nests. A partial lining of mud was added, and finally the dried mud-cup was lined with soft grasses.

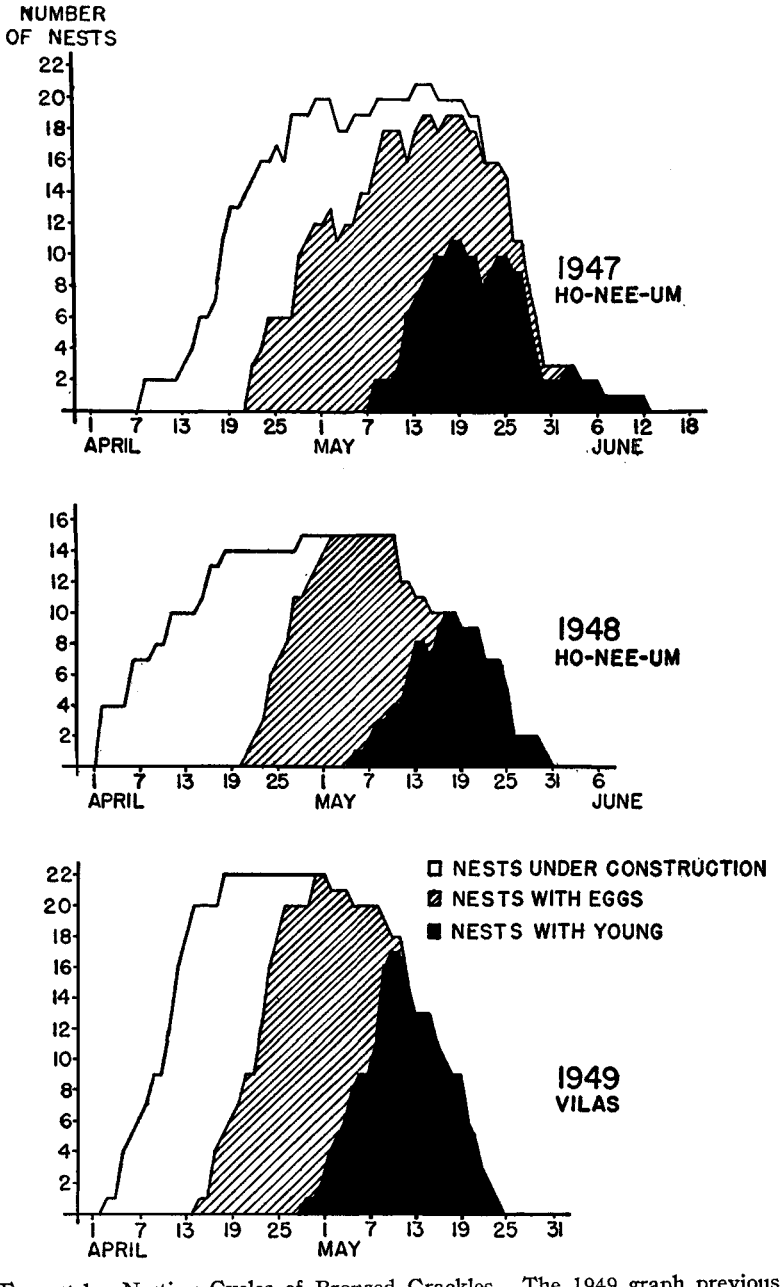


FIGURE 1.—Nesting Cycles of Bronzed Grackles. The 1949 graph previous to April 29 was made entirely by interpolation from 1947 and 1948 averages.

In 1947, 26 active nests were found. Twenty-one of these were in use from May 13 to May 15—a density of 4.2 nests per acre. Fifteen active nests were found in 1948; these were all in use at the same time (April 28–May 11), making a density of 3.0 nests per acre. The nesting was semi-colonial; most of the nests were crowded into the southwest corner of the area, and no evidence of territorial behavior was found.

In 1949 only three nests were completed at Ho-Nee-Um, although many grackles were seen there during March and April, and other nests, which may have been built by courting males as described above, were started. However, seven grackle nests were found in deciduous trees one block northwest, where there had been none in previous years. Because they were in inaccessible locations 25 to 35 feet above ground, detailed data on construction and success of these nests could not be obtained. They are known to have been active by observation of incubating females on each nest. It is thought that the disturbance from construction work adjacent to areas of previous concentrations of nests at Ho-Nee-Um may have caused the birds to nest in the new site.

On April 29, after it was realized that there would be no colony nesting at Ho-Nee-Um in 1949, observations were started at Vilas Park. Here 21 active nests were found in honeysuckle and other shrubbery which formed a dense hedge along the brow of a hill.

## EGGS AND YOUNG

In both 1947 and 1948 the first eggs were laid on April 21. In 1949 it was estimated that egg-laying started on April 15. The latest starting date for a clutch was May 11 in 1947, May 2 in 1948, and April 30 in 1949. The latest hatching date in 1947 was June 1, in 1948 it was May 17, and in 1949 it was May 11. Laying of eggs usually started about three days (extremes, 0 and 11 days) after the nest was completed. The eggs were ordinarily laid at the rate of one per day, and the usual clutch-size was five, the average being 4.9 (extremes, 3 and 7). Table 2 presents a comparison between the clutch-size in these nests and those studied by Trautman (1940: 390) at Buckeye Lake. Trautman's figures refer to eggs or young, and consequently the data are not strictly comparable. The Madison data refer to nests in which the clutch was apparently completed. In those containing three or four eggs it is possible that some were lost due to predation or some other cause.

The first full clutch was completed on April 27 in 1947, April 25 in 1948, and April 18 in 1949. Incubation (measured from time of com-

pletion of clutch to hatching of first egg) usually took 11 to 12 days. One clutch of four eggs, none of which developed, was incubated for 22 days in 1948 before being deserted. Males were never flushed from nests, and apparently the females did all of the incubation.

TABLE 2

CLUTCH-SIZE IN THE BRONZED GRACKLE

| | | *Number of Eggs* | | | | | |
|---|---|---|---|---|---|---|---|
| | | *3* | *4* | *5* | *6* | *7* | *Average* |
| Number of nests | Madison 1947 | 0 | 2 | 13 | 4 | 0 | 5.1 |
| | Madison 1948 | 1 | 2 | 10 | 2 | 0 | 4.9 |
| | Madison 1949 | 2 | 5 | 13 | 0 | 1 | 4.7 |
| | Buckeye Lake | 0 | 8 | 8 | 4 | 1 | 4.9* |
| TOTAL | | 3 | 17 | 44 | 10 | 2 | 4.9 |

* Trautman's figures for Buckeye Lake refer to eggs or young and are, therefore, not strictly comparable to the Madison data on completed clutches of eggs.

The young usually remained in the nest for about 12 days. This varied from 10 to 17 days, each extreme being represented by a single nest. Quite often one or two young would fledge several days after the other nestlings had left. The earliest fledging occurred May 22 in both years at Ho-Nee-Um, and May 12 in 1949; most fledging took place in the last week of May, but in 1947 it extended through June 12. Bierman (1944: 75) found young grackles still in the nest on June 26, 1944, in Forest County, Wisconsin, about 200 miles north of Madison.

At the time of leaving the nest the young generally were poor fliers, but they soon took up the wandering habit. Very few banded fledglings were seen on the areas after they were more than two or three days out of the nest. At the same time there was a noticeable influx of unbanded grackle fledglings. Trautman (1940: 391) noted that young grackles at Buckeye Lake left the nesting area almost as soon as they had fledged.

## SUCCESS IN NESTING

The average number of young produced by nests which survived the entire nesting period was 4.3 in 1947, 3.9 in 1948, and 3.8 in 1949, with a three-year average of 4.0 (Table 3). While each successful nest was more productive in 1947, a lower percentage of the nests (45 per cent) produced young that year than in 1948 (53) or 1949 (67) (Table 4).

The number of successful nests in all three years was 55 per cent of the total number of active nests. Nice (1937: 143) summarized the data in five studies of various species (mostly open nests of passerines)

and found a 45.9 per cent nest success. Young (1949: 45) also reviewing literature computed 74 per cent for 941 nests of four passerine species. The nest success determined in this study (55 per cent) is intermediate to the averages reported by Nice and Young, and more closely approaches the average nest success of 49.8 per cent found by Young (1949: 44) in his study of 110 nests of five passerine species nesting at Ho-Nee-Um in 1947.

TABLE 3

FLEDGING OF BRONZED GRACKLES

| | *Number of Young Fledged per Nest* | | | | | | |
|---|---|---|---|---|---|---|---|
| | *1* | *2* | *3* | *4* | *5* | *6* | *Average* |
| Number of nests 1947 | 1 | 0 | 1 | 3 | 7 | 0 | 4.3 |
| Number of nests 1948 | 0 | 1 | 1 | 4 | 2 | 0 | 3.9 |
| Number of nests 1949 | 0 | 2 | 3 | 5 | 4 | 0 | 3.8 |
| TOTAL | 1 | 3 | 5 | 12 | 13 | 0 | 4.0 |

Predation, desertion, and inclement weather were the causes of all nest failures in grackles, as shown in Table 5. Adverse weather conditions early in the season probably caused some of the failures attributed to desertion and so may be a more important factor than the summary indicates. The effect of storm damage was possibly intensified at Ho-Nee-Um by the spindly nature of the trees used for nesting.

TABLE 4

NESTING SUCCESS OF THE BRONZED GRACKLE

| | *1947* | *1948* | *1949* | *Totals and averages* |
|---|---|---|---|---|
| Active nests | 26 | 15 | 21 | 62 |
| Per cent successful | 45 | 53 | 67 | 55 |
| Number of eggs | 117 | 73 | 98 | 288 |
| Number hatching | 84 | 53 | 72 | 209 |
| Per cent hatching | 72 | 73 | 73 | 73 |
| Number of fledglings | 51 | 31 | 53 | 135 |
| Per cent of young fledging | 61 | 58 | 74 | 65 |
| Per cent of eggs producing fledglings | 44 | 42 | 54 | 47 |

Much of the predation is known to have been by young boys. The fact that both study areas were situated near public recreation areas made these nests particularly vulnerable to such interference. Other possible predators included: the Norway Rat, *Rattus norvegicus;* Blue Jay, *Cyanocitta cristata;* Crow, *Corvus brachyrhynchos;* Opossum, *Didelphis virginiana;* Garter Snake, *Thamnophis* sp.; and Chipmunk, *Tamias striatus.* On one occasion a grackle and a robin were seen in

common pursuit of a Blue Jay. There were several Cowbirds, *Molothrus ater*, at Ho-Nee-Um, but no Cowbird eggs were ever found in grackle nests. Friedmann (1925: 215) listed several instances in which Cowbirds laid eggs in Bronzed Grackle nests. Yellow Warblers, *Dendroica petechia*, nesting on the Ho-Nee-Um area were heavily parasitized by Cowbirds, and a grackle was once seen chasing a Cowbird.

TABLE 5

CAUSES OF FAILURES IN NESTS OF BRONZED GRACKLES

| NEST FAILURES | *1947* | *1948* | *1949* | *Total* | *Per cent* |
|---|---|---|---|---|---|
| Predation | 4 | 3 | 5 | 12 | 43 |
| Desertion | 8 | 2 | 2 | 12 | 43 |
| Weather | 2 | 2 | 0 | 4 | 14 |
| TOTAL | 14 | 7 | 7 | 28 | 100 |
| EGGS NOT HATCHING | *1947* | *1948* | *1949* | *Total* | *Per cent* |
| Predation | 19 | 8 | 10 | 37 | 47 |
| Desertion | 2 | 1 | 3 | 6 | 7 |
| Infertile or addled | 3 | 6 | 9 | 18 | 23 |
| Unaccounted for | 9 | 5 | 4 | 18 | 23 |
| TOTAL | 33 | 20 | 26 | 79 | 100 |
| YOUNG NOT FLEDGING | *1947* | *1948* | *1949* | *Total* | *Per cent* |
| Predation | 0 | 12 | 11 | 23 | 31 |
| Desertion | 9 | 4 | 4 | 17 | 23 |
| Weather | 17 | 3 | 0 | 20 | 27 |
| Fell from nest | 1 | 3 | 2 | 6 | 8 |
| Died in nest | 1 | 0 | 1 | 2 | 3 |
| Unaccounted for | 5 | 0 | 1 | 6 | 8 |
| TOTAL | 33 | 22 | 19 | 74 | 100 |

The young bird which died in the nest in 1947 had been banded, and the banded leg was broken and macerated, apparently by the bill of the parent. Beer (Unpublished Field Notes, 1947, Univ. Wis.) reported a similar incident in the Red-winged Blackbird, *Agelaius phoeniceus*. Possibly the whitish color of the band released the nest cleaning behavior of the parent, causing it to peck repeatedly at the banded leg. Lovell (1945: 145) recorded an incident in which a Song Sparrow, *Melospiza melodia*, dragged a banded young from its nest and pecked at the band until the leg was broken.

Since the nests were very closely followed, it was possible to determine or to approximate closely the time at which eggs and young disappeared as a result of predation or other causes. These data have have been used to construct the survival curves for the period in the nest; they are plotted in Figure 2. Eggs known to be non-viable were

excluded in this computation, while Tables 2 and 4 include all eggs laid.

The survival curves are quite different for the three years, as can be seen at a glance. However, the Ho-Nee-Um curves are similar in that the loss of young exceeded that of eggs, and survival to time of fledging was nearly the same in both years. The Vilas Park data closely parallel the three-year average during the incubation period, but show a greater than average survival of young. The 1949 (Vilas) season appears to be the most successful, since 63 per cent of the reproductive potential of viable eggs was attained.

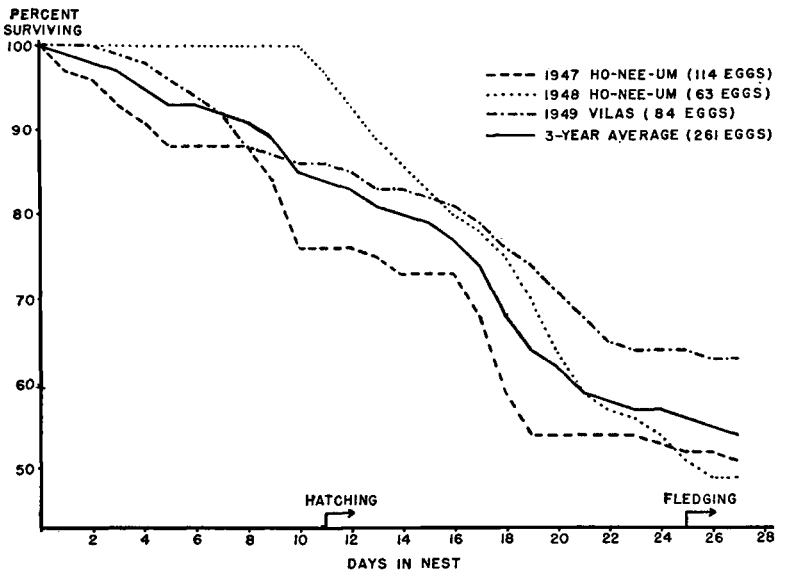


FIGURE 2.—Survival of Eggs and Young of Bronzed Grackles.

The three-year average in Figure 2 shows a rather uniform rate of mortality from egg-laying to fledging, with about 54 per cent of the viable eggs producing young. The potential yearly increase of grackles from these colonies was, therefore, nearly halved before the young had left the nest. Since a heavy mortality is usually to be expected among young birds immediately after fledging, a rather high survival rate of adults is needed to maintain the population.

## SUMMARY

1. The nesting behavior of Bronzed Grackles was studied during three breeding seasons at Madison, Wisconsin.

2. Males arrived on the nesting area the third week in March, about one week before the females; courtship started with the arrival of the females. Most courtship performances observed were in groups of four or five males displaying to one female.

3. The grackles range a mile or more from their nest sites, at least during the early part of the season.

4. Nest construction started the first week in April. In one colony the nests were built in arbor vitae; in the other they were built in dense honeysuckle hedges.

5. Nests were constructed by the females. However, a male courting a female was observed arranging nesting material in a loosely constructed nest which never contained eggs. Each year a number of nests were deserted in an early stage of construction.

6. The earliest eggs were laid on April 21 in 1947 and 1948, and April 15 in 1949. The latest starting date for a clutch was May 11. From three to seven eggs were laid, most nests had five eggs, and the average clutch was 4.9 eggs.

7. The earliest full clutch was completed on April 27 in 1947, on April 25 in 1948, and on April 18 in 1949. Incubation (clutch completion to first hatching) took 11 to 12 days. The female did all the incubating.

8. The young usually fledged at about 12 days of age (extremes, 10 and 17 days). The earliest fledging date was May 12; the latest was June 12. The young usually left the areas two or three days after fledging.

9. Fifty-five per cent of all nests were successful (produced at least one fledgling). These nests produced an average of 4.0 fledglings. Predation, desertion, and adverse weather were the causes of all nest failures. Of the 288 eggs laid, 73 per cent hatched and 47 per cent produced fledglings. Predation, mainly by young boys, was the greatest factor in loss of eggs and young.

10. The survival curve to fledging time for all individuals (from viable eggs) shows a uniform rate of mortality. Loss of nestlings exceeds loss of eggs. The potential yearly increase of grackles from these colonies was reduced by nearly one-half before the young had left the nest (54 per cent of the viable eggs produced fledglings).

LITERATURE CITED

BIERMAN, DON. 1944. Unusual Location of Grackle Nest. Passenger Pigeon, 6 (3): 75.

FORBUSH, EDWARD H. 1927. Birds of Massachusetts and Other New England States. Part II. (Mass. Dept. Agr.), 1 + 461 pp.

FRIEDMANN, HERBERT. 1929. The Cowbirds: A Study in the Biology of Social Parasitism. (Chas. C. Thomas, Springfield, Ill.), xvii + 421 pp.

LASKEY, AMELIA A. 1940. Bertram, A Blackbird with Personality. Bird-Lore, 42 (1): 25–30.

LOVELL, HARVEY B. 1945. Banded Song Sparrow Nestlings Removed by Parent. Bird-Banding, 16 (4): 144–145.

NICE, MARGARET M. 1937. Studies in the Life History of the Song Sparrow. I. Trans. Linn. Soc. New York, 4: vi + 247 pp.

SNYDER, L. L. 1937. Some Measurements and Observations from Bronzed Grackles. Can. Field-Nat., 51: 37–39.

TRAUTMAN, MILTON B. 1940. The Birds of Buckeye Lake, Ohio. (Univ. Mich. Press, Ann Arbor), 466 pp.

YOUNG, HOWARD F. 1949. A Comparative Study of Nesting Birds in a Five-Acre Park. Wilson Bull., 61 (1): 36–47.

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