where p_i is the probability for a certain head width x_i, n the sample size and s the standard deviation. The third variable is the kurtosis (in German *Exzess)* measure **E** with

$$E = \frac{\Sigma\, p_i\, (x_i - X)^4}{n\, s^4} - 3.$$

The discriminant value **L** is then computed as

$$L = X - 16.66\, S - 1.92\, E.$$

OTTO found nests with $L < 180$ as safely monogyneous and those with $L > 186$ were safely monogyneous.

In principle I can confirm OTTO's function as very useful method and, despite it has some sources of error, it does not deserve to be forgotten. My results are as follows:

About 80 % of investigated nests were determinable as mono- or polygyneous already in the field either from their very large workers and skewed body size distribution, from their numerous worker population or from direct observation of queens on mound surface in early spring. For reasons of the threatened status of wood ants, digging out was done in four nests only. In 103 nests, including a portion of nests with clear queen status, the OTTO function was calculated. I got **L** values between 128 and 184.6 for 67 polygyneous nests and such between 184.9 and 217 for 34 monogyneous nests. OTTO's results were similar but, weakly deviating from OTTO, I have *empirically* shifted the uncertain interval about two units to larger values with **L** = [182, 187.6]. The reason for this weak deviation is not known. Apart from possible adjustment errors of measuring devices, I can not exclude to have made a small subjective error in sampling; many of the samples were taken with a pincers at the outer nest margin which could have meant that larger workers were a little overrepresented because they attracted more attention of the collector's eye or because their recruitment rate for enemy defense towards the sampling spot was higher than in small workers. Thus behaviour of ants and collector as well could have produced a weakly biased sampling. Nevertheless, the results are satisfying. I got only 7 samples within uncertainty range of **L** meaning 2.1 % of undetermined samples. Fig. 13 shows the distribution of **L** values within the interval **L** = [160, 205].

However, this prima facie splendid determination rate of 98 % does not mean that certain sources of error need not be considered cautiously. At first, unclear results or even misidentifications with the OTTO function are to be expected one year or later after a shift from monogyny to polygyny. Nest No 46, a **pht I** nest, was a small colony with large workers and a clearly monogyneous body size distribution in the year 1984. At the second control of this nest in spring 1986, I noted an increase in population size (**A** = 10, see section 8.) and enlarged ratio of smaller workers and performed the OTTO analysis that resulted in an uncertain **L** = 186.9. In 1987, population size had enlarged further (**A** = 28) and I detected 5 or 6 queens on nest surface in early spring but **L** was still unclear (**L** = 184.6). The first save mathematic indication for polygyny with **L** = 169.7 I got in 1988 and population size was estimated equal to the previous year. This colony had obviously performed a shift from monogyny to polygyny in 1985 and possibly I would have got an **L** > 188 in case of calculation in late summer of this year and thus a misidentification.

Nest No 309, formerly a very populous **pht p** colony with a mound of 360 cm diameter and 120 cm height, is another example for a possible misidentification. No 309 was dying out in 1988. There were only a few hundred, mostly large surviving workers on the mound for which I calculated **L** = 197.9 which would definitely mean monogyny. A queen was not found and I believe the skewed distribution towards large workers more likely to be the result of the higher life expectancy of larger workers rather than to be an expression of a longer period of monogyny.

In very small colonies with small workers the OTTO function is suspected to provide, in case of bad nutritional conditions, an erroneous indication for polygyny but I have still no evidence for such a type of misidentification.