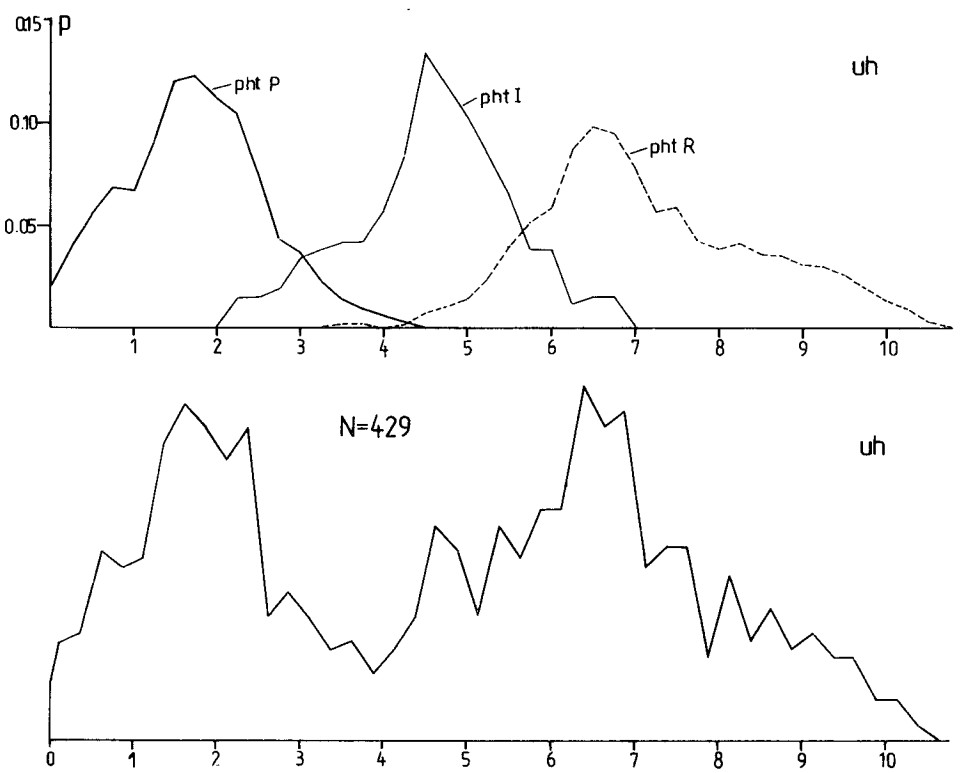
5. Monogyny and polygyny

5.1. The methods to distinguish between monogyny and polygyny

It was possible to assess the colony type immediately at the nest site in the majority of investigated wood ant nests. Such a field determination is facilitated by the fact that worker body size increases with growing size of nest populations in monogyneous colonies but decreases the larger the population number is in polygyneous colonies (see section 5.2, Fig. 14). Polydomous colonies are nearly always polygyneous although monogyneous colonies may consist of two or three separated mounds for shorter periods of time when the nest site is shifted.

If the site can not be observed for a reasonably long period and population or worker size are not sufficiently large to indicate the queen number, a test with OTTO's function is necessary. OTTO (1960) developed a method to discriminate between monogyneous and polygyneous colonies by a discriminant function the variables of which were obtained from head width measurements in 50 to 100 workers nest. He noted that monogyneous colonies characteristically showed a clearly skewed distribution with a steep, high peak at large head widths. In contrast, polygyneous colonies have symmetric, flatter frequency distributions with the highest frequencies near the mean or sometimes they have a broad bimodal symmetry. In the OTTO function we have three variables. The first is mean head width **X** of the sample given in units of 10 µm. The second is the skewness measure **S** with

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



Figs. 2–9 (continued overleaf) Frequency distribution of 429 sample means of different pilosity characters of workers both in a non-discriminated pooled histogram as well as in a discriminated presentation of relative frequencies **p** ($\Sigma p_i = 1$) for each phenotype. These relative frequencies were derived from the initial hypothesis. Data of two nests with clear phenotype mixtures are not incorporated.