



Fig. 13 The OTTO discriminant L to distinguish between monogynous and polygynous nests. Shown is only the interval L [160, 205]

5.2. The frequency of monogyny and polygyny in the phenotypes and the associated ecological strategies

We observe highly significant differences between the phenotypes in the frequency of monogyny polygyny. In **pht P**, 4 nests ($= 2.4\%$) were monogynous and 160 polygynous. OTTO (1960) reported for *Formica polyctena* from a sample of 59 investigated nests 5.1% as monogynous. It is likely that OTTO's "*Formica polyctena*" included a certain fraction of **pht I** nests which could explain the higher monogyny frequency. In **pht I**, I found 10 **pht IM** nests ($= 14.3\%$) and 60 **pht IP** nests which is, if tested in a χ^2 test, a highly significant difference ($p < 0.005$) to **pht P**. Still much larger is the difference to **pht R** where we have 148 **pht RM** nests ($= 75.9\%$) and 47 **pht RP** nests. Such a decrease of monogyny frequency from **pht R** across **pht I** to **pht P** ($75.9\% - 14.3\% - 2.4\%$) has many functional implications regarding the ecological strategy.

In general, it is an advantage for the fitness of a species to maintain in its gene pool a morphological and behavioural polymorphism. A reduction of polymorphism, i. e. the clear preference of a single ecological strategy is allowed when the habitat provides required recourse states in high and stable quantities for many generations. However, the conditions may change in such environments and the fitness of a species will be higher on the long-term scale if the gene pool has maintained at least in a small portion an alternative strategy. Such an ecotype is very probably presented by **pht P** for which I estimate to found at least 95% of new nests by colony splitting and 5% or less by socialparasitic colony initiation after dispersal flight. Such a socialparasitic colony foundation is very evident in nest No 106. This **pht PM** nest was discovered in a small wood isle within a large area of arable land near Luckau. In the site were present no other nests of any phenotype, no traces of abandoned older mounds could be found, and the potential host species *F. fusca* and *F. cunicularia* were abundant.

In coherent, large woodland areas, the favoured strategy for **pht P** is to extend its range through "step-by-step" dispersal by colony fission and to make a "large-scale-conquest" (ROSENGREN & PAMILO 1983) getting a superior place in the dominance hierarchy of insect societies. However, for eventual dispersal across large areas of land with no suited habitats, it must be very advantageous to maintain at least in a small portion the behavioural repertoire of single queen dispersal flight. Once having founded the first colony in such a way on a distant habitat patch, there is the chance to shift to polygyny and then to build up a polycalic colony. Such a sequence of events I assume for the site Petschkenberg - a small wood islet of 5000 m^2 in a vast area of bare arable land and 1.5 km away from the nearest small forest - where a polycalic colony of five large