to interpret the variates in terms of the original measurements. If part 2 of Table 5 is examined it can be seen that high values of cv_1 are expected from queens that have long heads, narrow post-petioles, large eyes, wide thorax, narrow frons and long spines, in decreasing order of importance; and from males that have long scapes, narrow thorax and small eyes, in decreasing order of importance. Similarly, high values of cv_2 are expected from queens that have narrow heads, long spines, wide frons and narrow petioles, and from males that have wide post-petioles, low post-petioles and many long hairs. Thus as was seen in Fig. 6, *M.hirsuta* queens have low values for cv_1 showing that this species tends to have short (rounder) heads, wide post-petioles, small eyes and spines with narrow thorax and wide frons compared to *M.sabuleti*. *M.scabrinodis* queens differ from *M.sabuleti* by higher values for cv_2 (i.e. not such big negative values) showing they have narrower heads, wider frons, narrower petioles and longer spines compared to *M.sabuleti*. Similarly, *M.scabrinodis* males differ from *M.sabuleti* males by low values of cv_1 (Fig. 7) showing that they have relatively short scapes, wide thorax and big eyes; *M.hirsuta* males have larger (not such big negative) values of cv_2 compared to *M.sabuleti* and thus differ by having relatively wide, low post-petioles and more and longer hairs.

(iv) *Validity of the canonical analysis*

If the above interpretation of the canonical variates given in Table 5 are compared with the results of the simple comparison between species, Tables 3 and 4, it can be seen that *M.hirsuta* queens are shown to differ from the others in much the same way whichever method is used; except that hairiness seems to be more important in Table 4 than it does in Table 5. *M.scabrinodis* queens are shown to differ from *M.sabuleti* queens in much the same way using either type of analysis in Table 3 or Table 5. In Tables 3, 4 and 5 *M.scabrinodis* males differ from the other two species, mainly by scape length, and in both Tables 4 and 5 *M.hirsuta* differs from the others, principally by hairiness and post-petiole width. It will be remembered from part (v) of the descriptive section that scape length, hairiness and post-petiole size were important in separating the males in the first instance, hence it is hardly surprising that these are shown to be important in the subsequent analysis; this illustrates the caution that should be taken against possible circularity of argument when using this type of analysis. However, in the case of queens initial classification was mainly on ecological considerations and scape shape, which have not been quantified, and hence the morphometric characters that are shown to be important in their separation are much more independent of initial prejudice than in the case of the males.

It might be asked what is the value of the canonical analysis if it shows what can be demonstrated from a simple two-way comparison (Tables 3 and 4) and if it has dangers of circularity. The answer is that it enables an unknown individual to be assigned to a group with a known confidence based upon many characters taken simultaneously. Here, it also demonstrates a very good separation of three closely related species in a way that cannot be done otherwise and yet is easily interpreted biologically. In due course it is hoped that this type of analysis can be applied to a similar set of data for many more *Myrmica* species, for then multivariate analysis becomes essential as simple two-dimensional comparisons become an almost impossibly cumbersome task.

Size seems to be relatively unimportant in the canonical analysis unlike a principal components analysis which would be expected to take out a size component first. This was checked by comparing the weightings given to the canonical vectors with similar weightings of the major components of a principal component analysis. Further, in the case of *M.hirsuta* queens an analysis of headwidths suggested two size classes of queen (Fig. 5) yet detailed examination of the cluster in Fig. 6 shows that the individuals from the two size classes are mixed together. This is important when true microgynes are considered; these should be perfect reductions of the normal queen and thus, if size is ignored, should be classified with the normal queens. It is hoped that a canonical analysis would only separate microgynes from the normal queens if they differed relatively in other respects than size.