

M.hirsuta do not conform to this pattern and form a cluster that is very distinct from those of the other two.

(iii) *Analysis based on twelve measurements*

In the previous section it was demonstrated that a few measurements were sufficient to illustrate that the three species differ morphologically. In this section more measurements, made on smaller samples, are investigated for both males and females. The mean values for these measurements are given in Table 2. Comparisons of Tables 1 and 2 show that the measurements based on the smaller samples agree well with those based on all the specimens and that the small samples are thus representative.

These measurements can be examined in either of two ways. First, the mean values for the measurements (Table 2) could be compared between the species, but, as we have already shown that there is a distinct size difference and because most of the measurements are correlated with size, relative differences will tend to be masked. One way of overcoming this problem is to standardize all the measurements for size; and this is done by considering headwidth to be a good measure of size and adjusting each specimen to a headwidth of 1 mm. The standardized size is then a ratio which makes strict statistical comparison difficult; however, the distributions of the standardized measurements, or ratios, are approximately normal, thus means and the associated variances can

TABLE 3. Comparison of measurements made for *M.scabrinodis* males and females (standardized for headwidth, see Table 5) with those for *M.sabuleti*. 0 means *M.scabrinodis* show no relative difference, + means relatively bigger and - means relatively smaller compared with *M.sabuleti*. The number of plus and minus signs indicate the level of significance when the measurements are compared by the 't' test; three signs show a difference at the 0.0001 level, two signs at the 0.001 level and one sign at the 0.01 level.

	Female	Male
Head length	+++	0
Frons width	+++	---
Eye length	0	+
Scape length		---
Thorax width	+	++
Spine length	+++	
Petiole width	--	0
Post-petiole width	0	0
Post-petiole height	0	0
Bristle length	0	+++
Bristle number	0	+++

be calculated for each species (Table 2). The mean ratios can then be compared by the 't' test and the results of this comparison are given in Tables 3 and 4. A second, better, way is to use a multivariate analytical technique to discriminate between the species taking account of all the measurements simultaneously. Canonical variate analysis is suitable for this purpose and has been carried out on the measurements made for both males and females of the three species. A canonical analysis assumes pre-established groups and then maximizes the ratio of the variance between the groups to the variance

TABLE 4. Comparison of the values of the various measurements (relative to headwidth, see Table 5) of *M.hirsuta* with *M.scabrinodis* and *M.sabuleti*. 0, + and - mean that *M.hirsuta* have relatively no difference, bigger or smaller body characters than the species at the head of the column. Three plus or minus signs indicate a difference at 0.0001 by chance, two signs at the 0.001 level and one sign at the 0.01 level.

	Females		Males	
	<i>M.scabrinodis</i>	<i>M.sabuleti</i>	<i>M.scabrinodis</i>	<i>M.sabuleti</i>
Head length	--	0	0	0
Frons width	+++	+++	+++	0
Eye length	---	--	---	---
Scape length			+++	0
Thorax width	0	0	---	0
Spine length	---	---		
Petiole width	+++	+++	+++	+++
Post-petiole width	+++	+++	+++	+++
Post-petiole height	+++	+++	+	+++
Bristle length	+++	+++	0	+++
Bristle number	+++	+++	+++	+++