

A NOTE ON CHROMOSOMES OF SOME QUEENSLAND DACINAE (*TRYPETIDAE*, *DIPTERA*).

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SUMMARY.

Larval salivary gland and metaphase chromosomes of the following species were studied: *Afrodacus jarvisi* (Tryon), *Austrodacus cucumis* (French), *Diplodacus signatifer* (Tryon), *Strumeta bryoniae* (Tryon), *Strumeta cacuminata* Hering, *Strumeta humeralis* (Perk.), *Strumeta tryoni* (Frogg.).

All species except *A. jarvisi*, for which $2n = 14$, have 6 pairs of somatic chromosomes.

The aceto-orcein squash technique proved unsatisfactory for detailed analyses.

INTRODUCTION.

As a contribution which may assist in a review of Queensland Dacinae (note May 1953), a study of the chromosomes of the sub-family was commenced recently.

Frizzi and Springhetti (1953) described the salivary gland and metaphase chromosomes of *Dacus oleae* Gmel. in Italy, and commented on minor variations in banding in terminal portions of the giant chromosomes. There is no published account of similar work in Australia, and this note is intended as a preliminary report.

MATERIAL AND METHODS.

The following seven species were given attention: *Afrodacus jarvisi* (Tryon) (12 larvæ examined), *Austrodacus cucumis* (French) (12), *Diplodacus signatifer* (Tryon) (6), *Strumeta bryoniae* (Tryon) (6), *Strumeta cacuminata* Hering (6), *Strumeta humeralis* (Perk.) (12), and *Strumeta tryoni* (Frogg.) (30)

Preparations were made from "brain" ganglia and salivary glands of mature larvae of all species except *signatifer*, in which testes from pupæ and newly emerged flies were used. Larvae of *jarvisi*, *cucumis*, *humeralis* and *tryoni* were from stocks of flies maintained in the Toowoomba laboratory of this Department. Those of *bryoniae* and *cacuminata* were taken respectively from field-infested *Bryonopsis laciniosa* (L.) Naud. and *Solanum auriculatum* Ait., in which they occur virtually to the exclusion of other species (May 1953). The larvae of *bryoniae* and *cacuminata* can be identified (see Exley 1955), and the rearing of adults from the larvae remaining in dissected fruit was found a reliable check.

Fixatives and staining techniques tried included acetic acid 45%, modified Kahle solution, aceto-orcein, aceto-carmin, and the Feulgen staining technique (Smith 1953).

The following method yielded the best results. The tissue was crushed in 45% acetic acid under cellophane, and the slide was then placed in the same solution until the cellophane fell off (Slizynski 1952). Staining was carried out in aceto-orcein (Demerec and Kaufmann 1950) for about one hour. After three minutes in each of 70% alcohol, 90% alcohol, absolute alcohol, and xylol, the preparation was mounted in Canada balsam.

Metaphase plates of *jarvisi* (11 plates), *bryonica* (9), *humeralis* (10) and *tryoni* (9) were drawn with a camera lucida and the chromosome lengths measured to the nearest 0.5 mm. These were tabulated for each species as percentages of total chromosome lengths (T.C.L.) for pairs (Boyes and Wilkes 1953, Boyes 1954).

RESULTS AND DISCUSSION.

Prominent banding was evident in some parts of the giant salivary gland chromosomes. Discontinuities, adhesions and scattered heterochromatin, however, prevented analyses (note Fig. 1).

All species except *jarvisi*, for which $2n = 14$ (Fig. 5), have 6 pairs of somatic chromosomes (Figs. 2-4).

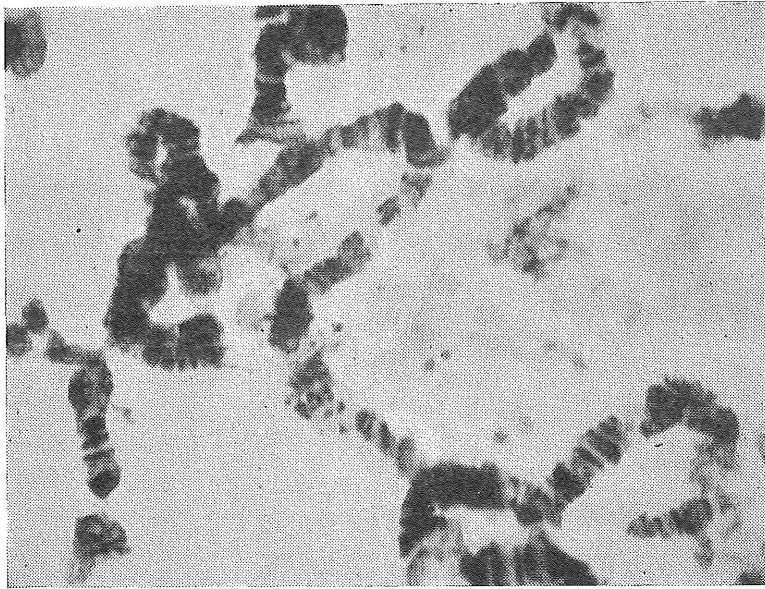


Fig. 1.

Strumeta cacuminata. Part of nucleus of larval salivary gland cell. ($\times 2850$).

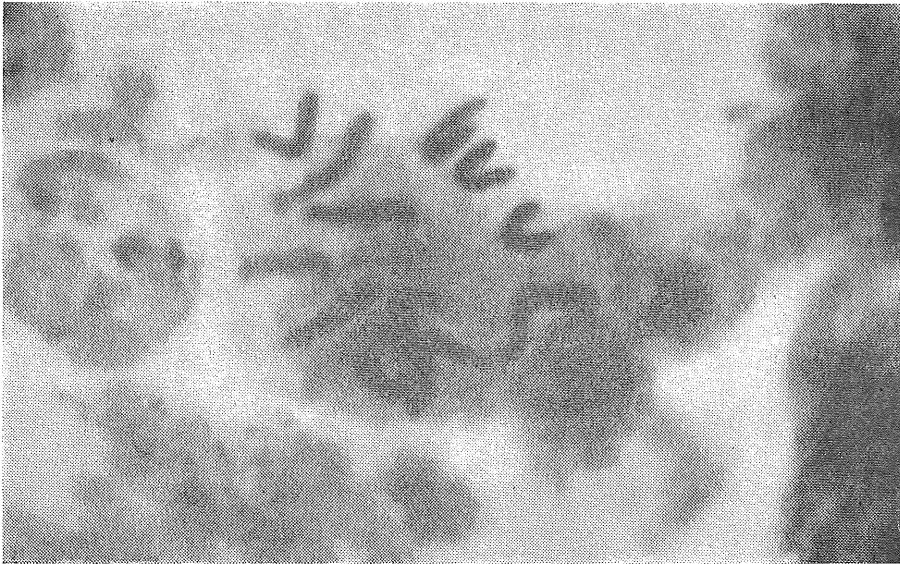


Fig. 2.
Strumeta humeralis. Metaphase chromosomes of larval brain. ($\times 2850$).

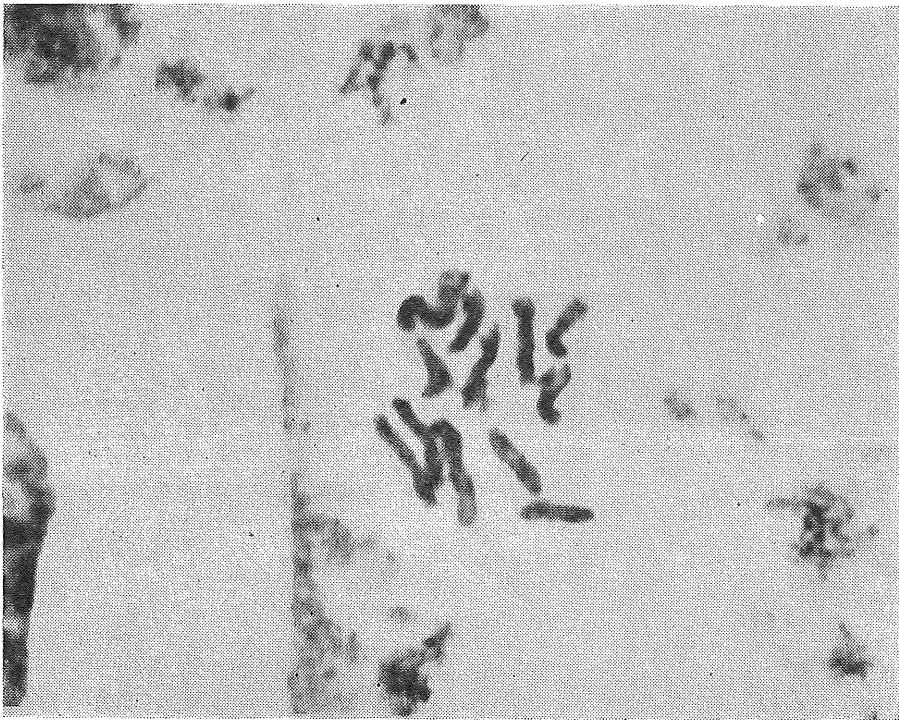


Fig. 3.
Strumeta bryoniae. Metaphase chromosomes of larval brain. ($\times 2850$).

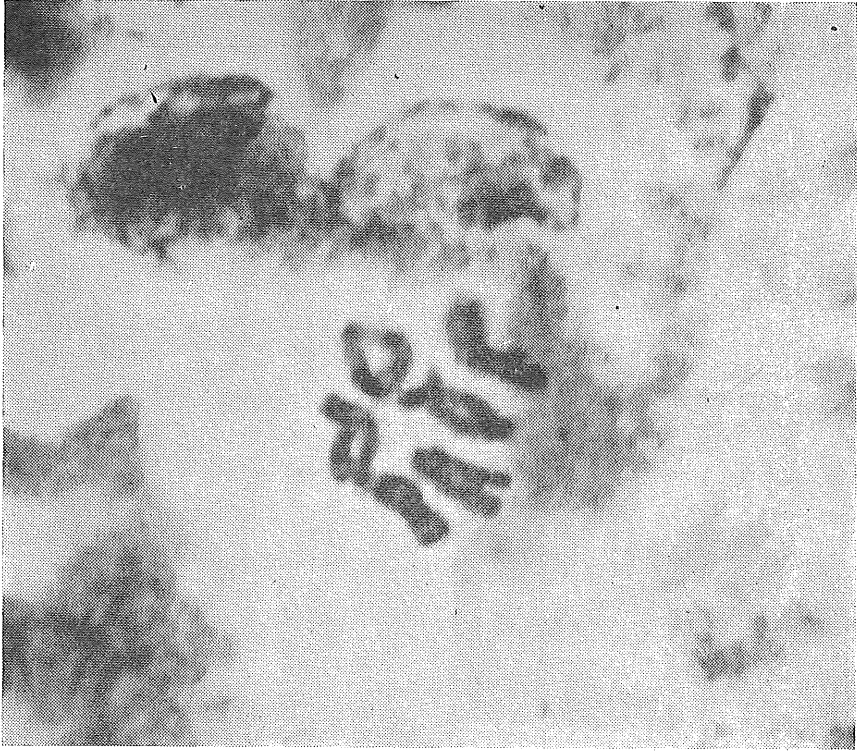


Fig. 4.

Strumeta tryoni. Metaphase chromosomes of larval brain. ($\times 2850$).

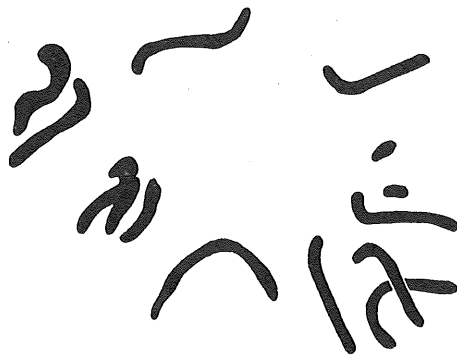


Fig. 5.

Afrodacus jarvisi. Metaphase chromosomes of larval brain. ($\times 3200$).

With the technique used, the centromeres could not be located with certainty, thus precluding the use of arm ratio as well as relative chromosome length, which may have made possible the identification of analagous chromosome pairs in different metaphase plates. The T.C.L. data as given in the appendix are therefore merely a chromosome size ranking for each plate and are unsuitable for analyses of intra-specific variation and inter-specific differences.

The reasonable consistencies in measurements within a species indicate, however, that the techniques were faithfully applied, but as with salivary gland chromosomes these do not give promise of helping to advance the project.

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APPENDIX.

| Size Rating. | Total for Pairs. | Percentage Total Complement Length. |
|--------------------------|------------------|--|
| <i>Afrodacus jarvisi</i> | | |
| I | 31 | 21 |
| II | 26 | 18 |
| III | 21 | 14 |
| IV | 20 | 14 |
| V | 18 | 12 |
| VI | 18 | 12 |
| VII | 12 | 8 |
| | TCL 146 | |
| I | 36 | 18 |
| II | 34 | 17 |
| III | 34 | 17 |
| IV | 31 | 16 |
| V | 31 | 16 |
| VI | 21 | 11 |
| VII | 12 | 6 |
| | TCL 199 | |
| I | 32 | 20 |
| II | 27 | 17 |
| III | 26 | 16 |
| IV | 25 | 16 |
| V | 22 | 14 |
| VI | 22 | 14 |
| VII | 5 | 3 |
| | TCL 159 | |
| I | 30 | 20 |
| II | 29 | 20 |
| III | 26 | 18 |
| IV | 20 | 14 |
| V | 19 | 13 |
| VI | 18 | 12 |
| VII | 6 | 4 |
| | TCL 148 | |
| I | 35 | 24 |
| II | 24 | 16 |
| III | 22 | 15 |
| IV | 22 | 15 |
| V | 20 | 14 |
| VI | 17 | 11 |
| VII | 8 | 5 |
| | TCL 148 | |

| Size Rating. | Total for Pairs. | Percentage Total Complement Length. |
|--------------------------|------------------|-------------------------------------|
| <i>Afrodacus jarvisi</i> | | |
| I | 28 | 18 |
| II | 28 | 18 |
| III | 26 | 17 |
| IV | 24 | 16 |
| V | 23 | 15 |
| VI | 18 | 12 |
| VII | 6 | 4 |
| | TCL 153 | |
| I | 34 | 23 |
| II | 28 | 19 |
| III | 23 | 16 |
| IV | 22 | 15 |
| V | 21 | 14 |
| VI | 20 | 14 |
| VII | ... | |
| | TCL 148 | |
| I | 30 | 17 |
| II | 29 | 16 |
| III | 28 | 16 |
| IV | 28 | 16 |
| V | 26 | 15 |
| VI | 26 | 15 |
| VII | 12 | 7 |
| | TCL 179 | |
| I | 34 | 18 |
| II | 32 | 17 |
| III | 31 | 16 |
| IV | 31 | 16 |
| V | 28 | 15 |
| VI | 28 | 15 |
| VII | 6 | 3 |
| | TCL 190 | |
| I | 37 | 20 |
| II | 35 | 19 |
| III | 31 | 17 |
| IV | 28 | 15 |
| V | 28 | 15 |
| VI | 26 | 14 |
| VII | .. | |
| | TCL 185 | |

| Size Rating. | Total for Pairs. | Percentage Total Complement Length. |
|--------------|------------------|-------------------------------------|
|--------------|------------------|-------------------------------------|

Afrodacus jarvisi—continued.

| | | |
|-----|---------|----|
| I | 39 | 21 |
| II | 35 | 19 |
| III | 31 | 17 |
| IV | 28 | 15 |
| V | 25 | 14 |
| VI | 18 | 10 |
| VII | 6 | 3 |
| | TCL 182 | |

| Size Rating. | — | Total for Pairs. | Percentage Total Complement Length. |
|--------------|---|------------------|-------------------------------------|
|--------------|---|------------------|-------------------------------------|

Strumeta bryoniae

| | | | | |
|-----|------|------|---------|----|
| I | 13-0 | 14-0 | 27 | 22 |
| II | 12-0 | 11-0 | 23 | 18 |
| III | 10-0 | 10-0 | 20 | 16 |
| IV | 10-0 | 10-0 | 20 | 16 |
| V | 8-5 | 9-5 | 18 | 14 |
| VI | 8-0 | 9-0 | 17 | 14 |
| | | | TCL 125 | |
| I | 14-0 | 14-0 | 28 | 20 |
| II | 11-0 | 13-0 | 24 | 17 |
| III | 12-0 | 12-0 | 24 | 17 |
| IV | 11-0 | 11-0 | 22 | 16 |
| V | 11-0 | 10-0 | 21 | 15 |
| VI | 9-5 | 9-5 | 19 | 14 |
| | | | TCL 138 | |
| I | 16-0 | 16-0 | 32 | 22 |
| II | 15-0 | 15-0 | 30 | 20 |
| III | 14-0 | 14-0 | 28 | 19 |
| IV | 11-0 | 11-0 | 22 | 15 |
| V | 10-0 | 10-0 | 20 | 14 |
| VI | 8-0 | 8-0 | 16 | 11 |
| | | | TCL 148 | |

| Size Rating. | — | | Total for Pairs. | Percentage Total Complement Length. |
|--------------------------------------|------|------|------------------|-------------------------------------|
| <i>Strumeta bryoniae</i> —continued. | | | | |
| I | 13.5 | 13.5 | 27 | 21 |
| II | 12.5 | 12.5 | 25 | 20 |
| III | 10.5 | 10.5 | 21 | 17 |
| IV | 9.5 | 9.5 | 19 | 15 |
| V | 9.0 | 9.0 | 18 | 14 |
| VI | 8.0 | 8.0 | 16 | 13 |
| | | | TCL 126 | |
| I | 13.0 | 13.0 | 26 | 23 |
| II | 12.0 | 12.0 | 24 | 21 |
| III | 10.0 | 10.0 | 20 | 18 |
| IV | 8.0 | 8.0 | 16 | 14 |
| V | 7.5 | 7.5 | 15 | 13 |
| VI | 6.0 | 6.0 | 12 | 11 |
| | | | TCL 113 | |
| I | 17.0 | 18.0 | 35 | 24 |
| II | 14.0 | 13.0 | 27 | 18 |
| III | 12.0 | 12.0 | 24 | 16 |
| IV | 11.0 | 11.0 | 22 | 15 |
| V | 11.0 | 10.0 | 21 | 14 |
| VI | 10.0 | 7.0 | 17 | 12 |
| | | | TCL 146 | |
| I | 16.0 | 15.0 | 31 | 23 |
| II | 13.0 | 12.0 | 25 | 19 |
| III | 12.0 | 12.0 | 24 | 18 |
| IV | 12.0 | 11.0 | 23 | 17 |
| V | 8.0 | 7.0 | 15 | 11 |
| VI | 6.0 | 9.0 | 15 | 11 |
| | | | TCL 133 | |
| I | 13.0 | 13.0 | 26 | 21 |
| II | 12.0 | 12.0 | 24 | 19 |
| III | 10.0 | 11.0 | 21 | 17 |
| IV | 10.0 | 9.0 | 19 | 15 |
| V | 9.0 | 9.0 | 18 | 14 |
| VI | 9.0 | 8.0 | 17 | 14 |
| | | | TCL 125 | |

| Size Rating. | — | Total for Pairs. | Percentage Total Complement Length. |
|--------------|---|------------------|-------------------------------------|
|--------------|---|------------------|-------------------------------------|

Strumeta bryoniae—continued.

| | | | | |
|-----|------|------|---------|----|
| I | 13-0 | 13-0 | 26 | 25 |
| II | 10-0 | 8-0 | 18 | 17 |
| III | 9-0 | 8-0 | 17 | 16 |
| IV | 8-0 | 8-0 | 16 | 15 |
| V | 7-0 | 7-0 | 14 | 13 |
| VI | 7-0 | 6-0 | 13 | 13 |
| | | | TCL 104 | |

Strumeta humeralis

| | | | | |
|-----|----|----|---------|----|
| I | 16 | 16 | 32 | 21 |
| II | 14 | 14 | 28 | 18 |
| III | 14 | 14 | 28 | 18 |
| IV | 12 | 12 | 24 | 16 |
| V | 11 | 11 | 22 | 14 |
| VI | 11 | 7 | 18 | 12 |
| | | | TCL 152 | |
| I | 16 | 16 | 32 | 20 |
| II | 15 | 15 | 30 | 18 |
| III | 12 | 12 | 24 | 15 |
| IV | 12 | 12 | 24 | 15 |
| V | 11 | 12 | 23 | 14 |
| VI | 22 | 9 | 31 | 19 |
| | | | TCL 164 | |
| I | 18 | 18 | 36 | 21 |
| II | 16 | 16 | 32 | 19 |
| III | 16 | 16 | 32 | 19 |
| IV | 14 | 14 | 28 | 16 |
| V | 12 | 12 | 24 | 14 |
| VI | 12 | 8 | 20 | 12 |
| | | | TCL 172 | |
| I | 16 | 16 | 32 | 23 |
| II | 12 | 16 | 28 | 20 |
| III | 11 | 13 | 24 | 17 |
| IV | 11 | 11 | 22 | 15 |
| V | 11 | 11 | 22 | 15 |
| VI | 9 | 5 | 14 | 10 |
| | | | TCL 142 | |

| Size Rating. | — | | Total for Pairs. | Percentage Total Complement Length. |
|--------------------------------------|------|------|------------------|-------------------------------------|
| <i>Strumeta humeralis—continued.</i> | | | | |
| I | 20 | 20 | 40 | 22 |
| II | 17 | 18 | 35 | 19 |
| III | 16.5 | 16.5 | 33 | 18 |
| IV | 14 | 15 | 29 | 16 |
| V | 13 | 13 | 26 | 14 |
| VI | 10 | 10 | 20 | 11 |
| | | | TCL 183 | |
| I | 25 | 25 | 50 | 23 |
| II | 20 | 20 | 40 | 19 |
| III | 20 | 20 | 40 | 19 |
| IV | 18 | 16 | 34 | 16 |
| V | 16 | 16 | 32 | 15 |
| VI | 10 | 10 | 20 | 9 |
| | | | TCL 216 | |
| I | 22 | 20 | 42 | 19 |
| II | 21 | 20 | 41 | 18 |
| III | 20 | 20 | 40 | 18 |
| IV | 18 | 18 | 36 | 16 |
| V | 16 | 16 | 32 | 14 |
| VI | 19 | 15 | 34 | 15 |
| | | | TCL 225 | |
| I | 17 | 17 | 34 | 22 |
| II | 15 | 15 | 30 | 19 |
| III | 12.5 | 12.5 | 25 | 16 |
| IV | 12 | 12 | 24 | 15 |
| V | 12 | 12 | 24 | 15 |
| VI | 9 | 9 | 18 | 12 |
| | | | TCL 155 | |
| I | 21 | 19 | 40 | 22 |
| II | 18 | 18 | 36 | 20 |
| III | 16 | 16 | 32 | 17 |
| IV | 15 | 15 | 30 | 16 |
| V | 10 | 8 | 18 | 10 |
| VI | 11 | 17 | 28 | 15 |
| | | | TCL 184 | |

| Size Rating. | — | | Total for Pairs. | Percentage Total Complement Length. |
|--------------------------------------|------|------|------------------|-------------------------------------|
| <i>Strumeta humeralis—continued.</i> | | | | |
| I | 19 | 20 | 39 | 21 |
| II | 17.5 | 17.5 | 35 | 19 |
| III | 15 | 16 | 31 | 17 |
| IV | 14 | 17 | 31 | 17 |
| V | 11.5 | 13.0 | 24.5 | 13 |
| VI | 16.0 | 11.0 | 27.0 | 14 |
| | | | TCL 187.5 | |
| <i>Strumeta tryoni</i> | | | | |
| I | 15 | 15 | 30 | 22 |
| II | 13 | 13 | 26 | 19 |
| III | 11.5 | 12.5 | 24 | 17 |
| IV | 10 | 10 | 20 | 14 |
| V | 10 | 10 | 20 | 14 |
| VI | 9.5 | 9.5 | 19 | 14 |
| | | | TCL 139 | |
| I | 16 | 15 | 31 | 21 |
| II | 14 | 14 | 28 | 19 |
| III | 14 | 14 | 28 | 19 |
| IV | 11 | 11 | 22 | 15 |
| V | 11 | 11 | 22 | 15 |
| VI | 7 | 8 | 15 | 10 |
| | | | TCL 146 | |
| I | 25 | 24 | 49 | 25 |
| II | 22 | 25 | 47 | 24 |
| III | 17 | 16 | 33 | 17 |
| IV | 12 | 13 | 25 | 13 |
| V | 12 | 12 | 24 | 12 |
| VI | 10 | 8 | 18 | 9 |
| | | | TCL 196 | |
| I | 14 | 14 | 28 | 21 |
| II | 13 | 12 | 25 | 19 |
| III | 11 | 10 | 21 | 16 |
| IV | 11 | 9 | 20 | 15 |
| V | 11 | 9 | 20 | 15 |
| VI | 10 | 8 | 18 | 14 |
| | | | TCL 132 | |

| Size Rating. | — | | Total for Pairs. | Percentage Total Complement Length. |
|------------------------------------|----|----|------------------|-------------------------------------|
| <i>Strumeta tryoni</i> —continued. | | | | |
| I | 25 | 25 | 50 | 27 |
| II | 18 | 17 | 35 | 19 |
| III | 15 | 13 | 28 | 15 |
| IV | 13 | 13 | 26 | 14 |
| V | 13 | 13 | 26 | 14 |
| VI | 12 | 11 | 23 | 12 |
| | | | TCL 188 | |
| I | 15 | 16 | 31 | 21 |
| II | 15 | 14 | 29 | 20 |
| III | 13 | 12 | 25 | 17 |
| IV | 11 | 10 | 21 | 14 |
| V | 11 | 9 | 20 | 14 |
| VI | 10 | 9 | 19 | 13 |
| | | | TCL 145 | |
| I | 18 | 20 | 38 | 22 |
| II | 17 | 17 | 34 | 20 |
| III | 15 | 15 | 30 | 18 |
| IV | 13 | 13 | 26 | 15 |
| V | 10 | 12 | 22 | 13 |
| VI | 10 | 10 | 20 | 12 |
| | | | TCL 170 | |
| I | 20 | 18 | 38 | 26 |
| II | 14 | 13 | 27 | 18 |
| III | 11 | 11 | 22 | 15 |
| IV | 10 | 11 | 21 | 14 |
| V | 10 | 11 | 21 | 14 |
| VI | 10 | 10 | 20 | 13 |
| | | | TCL 149 | |
| I | 15 | 16 | 31 | 21 |
| II | 15 | 15 | 30 | 20 |
| III | 15 | 13 | 28 | 19 |
| IV | 14 | 13 | 27 | 18 |
| V | 10 | 8 | 18 | 12 |
| VI | 9 | 8 | 17 | 11 |
| | | | TCL 151 | |