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The following abbreviations hold good for all the plates except Pl.II, Pl.IV and Pl.V, where the Acroblast is labelled as A and Acrosome as A_1 or A_2.

A — Acrosome.
Ab — Acroblast.
A.ch — Sex-chromosomes.
A.f. or A.f — Axial filament.
A.g — Acrosomal granule.
A.v — Acrosomal vesicle.
C — Centriole.
Ch — Chromosomes.
C.B — Chromophobic area of mitochondrial nebenkern.
C.G or C.g — Chromatin granules.
C.L — Chromophilic area of mitochondrial nebenkern.
C.s — Central substance granules.
G — Golgi body.
G.r — Golgi remnant.
M — Mitochondria.
M.n — Mitochondrial nebenkern.
M.B — Mid-body.
N — Nucleus.
N_1 — Nucleolus.
S.f — Spindle fibres.
S.r — Spindle remnants.
V — Tail vesicle or bleb.
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Figures 1 - 84, Plates I - IV; Figures 99 - 115, Plate VI; Figures 116 - 136, Plate VII; Figures 137 - 142, Plate VIII; Figures 154 - 181, Plate IX; Figures 182 - 215, Plates X and XI; Figures 231 - 254, Plate XIII and Figures 255 - 281, Plates XIV and XV have been drawn with a camera lucida at the table level with Spencer 10X eye-piece and oil immersion objective giving approximate magnification of 1,700 times.

Figures 25 - 98, Plate V; Figures 142 - 153, Plate VIII and Figures 216 - 230, Plate XII are from the fresh material studied under the Phase contrast microscope.

Unless otherwise stated all the Figures of the Plates I - IV and VII; Figures 137 - 141, Plate VIII and all Figures of the Plates IX, X, XI, XIII, XIV and XV have been selected from sectioned material fixed in Flemming-without-acetic acid followed by 0.5% iron haematoxylin.

All Figures of the Plate VI are from the material fixed in Bouin's fluid.
Plate I (Laccotrephes maculatus)

Fig. 1. Resting spermatogonia.

2. Primary spermatocyte showing leptotene nucleus, mitochondria and Golgi elements.

3. Primary spermatocyte showing the sex-chromosomes condensed into a deeply-staining body.

4. Primary spermatocyte showing scattered Golgi bodies, mitochondria and the nucleus revealing nucleolus, sex- chromosomes and pachytene threads.

5. Primary spermatocyte. Diplotene stage.

6. Primary spermatocyte showing tetrads. Two crescentic centrioles in the cytoplasm are very clear (Bouin's).

Figs. 7 and 8. Primary spermatocytes showing condensation of the tetrads into dumb-bell chromosomes.

Fig. 9. Polar view of metaphase I showing 22 chromosomes.

10. Primary spermatocyte showing two centrioles located at the apices of the meiotic spindle. The mitochondria are arranged on either side of the spindle.

11. Early anaphase I.

12. Telophase I showing mid-body granules at the equator of the dividing cell.

13. Polar view telophase I.

14. Polar view metaphase II showing 22 chromosomes (Bouin's).

15. Polar view metaphase II showing 22 chromosomes.

16. Side view metaphase II showing the crescentic centrioles at the two poles of the spindle and scattered Golgi bodies.
Fig. 17. Side view metaphase II showing two X chromosomes going towards one pole and a Y chromosome to the opposite pole (Bouin's).

Fig. 18. Early anaphase II.

Figs. 19-21. Telophase II.

Plate II (Laccotrephes maculatus)

Figs. 22 and 23. Early spermatids. The Golgi bodies aggregate in the neck between nucleus and mitochondrial nebenkern. Deeply-staining chromatid is seen along the periphery of the nucleus.

Fig. 24. Spermatid showing homogeneously staining nucleus; vacuolar chromophilic core of the nebenkern and an acroblast with acrosomal granule.

Figs. 25-27. Spermatids showing dissolution of transverse strands of the nebenkern. The axial filament is springing from the centriole.

Figs. 28 and 29, and 31-33. Spermatids showing gradual obliteration of the chromophilic core of the nebenkern and the movement of the acroblast with the acrosomal granule round the nucleus.

Fig. 30. T.S. tail region of the spermatid showing small chromophilic core and numerous 'central substance' granules in the chromophobic area.

Figs. 34 and 35. Spermatids. The nebenkern elongates and gets constricted into tail vesicles.

Figs. 36 and 37. Spermatids showing disassociation of the acrosome from the acroblast.
Figs. 38-41. Progressive stages in the elongation of the sperm nucleus.

Fig. 42. Mature sperm showing deeply-staining nucleus with an acrosome at its tip and a long tail posteriorly (F.W.A. smear).

Plate III (Sphaerodema rusticum)

Fig. 43. A group of spermatogonia. Each spermatogonium showing a nucleus, an irregular nucleolus and a few mitochondrial granules in the cytoplasm.

" 44. Polar view spermatogonial metaphase showing 28 distinct chromosomes (Bouin's).

" 45. Side view spermatogonial metaphase.

" 46. Spermatogonial telophase. The mitochondria are forming a palisade round the spindle.

Figs. 47 and 48. Primary spermatocytes showing mitochondria and deeply-staining Golgi bodies. Two distinct sex-chromosomes in the preleptotene nuclei can be seen also.

Fig. 49. Primary spermatocyte showing leptotene nucleus.

" 50. Primary spermatocyte showing pachytene nucleus (Bouin's).

" 51. Primary spermatocyte showing diplotene chromosomes. The Golgi bodies and vesicular mitochondria are juxta-nuclear.

" 52. Primary spermatocyte showing diffuse nucleus.

Figs. 53-55. Primary spermatocytes showing diakinesis.

Fig. 56. Primary spermatocyte showing 14 bivalents (Bouin's).

" 57. Polar view metaphase I showing 15 chromosomes.

" 58. Side view metaphase I. The two crescentic centrioles can be seen at the two poles of the spindle.
Fig. 59. Early anaphase I.
" 60. Polar view anaphase I.

Plate IV (Sphaerodema rusticum)

Fig. 61. Telophase I.
" 62. Polar view metaphase II.
" 63. Side view metaphase II.
" 64. Telophase II.

Figs. 65-67. Spermatids showing coalescence of mitochondria and the fusion of the Golgi bodies.

" 68 and 69. Spermatids showing nucleus with a deeply-staining granule in its interior; mitochondrial nebenkern, acroblast with an acrosomal granule.

" 70-73. Spermatids showing progressive differentiation of the nebenkern and the growth of the acrosomal granule.

" 74-76. Spermatids showing the elongation of the mitochondrial nebenkern.

" 77-79. Late spermatids. The acrosomal granule separates from the acroblast which moves down in the tail of the spermatid.

Fig. 80. Tail vesicle of the spermatid showing a sloughed off Golgi body in its interior.

Figs. 81-83. Late spermatid heads showing deeply-staining acrosome and a uniformly staining nucleus.

Fig. 84. Mature sperm (F.W.A. smear).
Plate V (Laccotrephes maculatus)

Under Phase contrast microscope.

Fig. 85. Primary spermatocyte showing nucleus, spherical Golgi bodies and vesicular mitochondria.

86. Polar view metaphase I showing 22 chromosomes.

87. Side view metaphase I. The Golgi and the mitochondria are forming a palisade round hyaline spindle area. Two crescentic centrioles are also seen.

88. Telophase I showing mitochondria and the deposition of the mid-body granules at the equator of the dividing cell.

89. An early spermatid showing the compact mass of vesicular mitochondria and an acroblast.

90. Spermatid showing uniformly grey nucleus, acroblast and mitochondrial nebenkern differentiated into outer vacuolar chromophobic area and inner solid chromophilic core.

91. Spermatid showing the axial filament dividing the mitochondrial nebenkern into two halves.

92. Spermatid showing the differentiation of the acroblast into acrosomal granule.

93. Two spermatids enclosed in a common cell wall showing nucleus; acroblast accompanied with an acrosomal granule and 'central substance' granules in the chromophobic area of the mitochondrial nebenkern.

94. Spermatid showing centriole lying on the surface of the nucleus from which springs the axial filament dividing the nebenkern into two halves.
Figs. 95-97. Progressive stages of the elongation of the spermatid.

Fig. 98. Very late spermatid showing nucleus, attached to which is the acrosome.

Plate VI (Ranaatra esordiula)

Fig. 99. Spermatogonium.

100. Polar view spermatogonial metaphase.
102. Primary spermatocyte. Leptotene stage. Four sex-chromosomes and a deeply-staining nucleolus is also seen.
103. Primary spermatocyte. Early zygotene.
104. Primary spermatocyte. Late zygotene.
105. Primary spermatocyte. Pachytene.
106. Primary spermatocyte. Diplotene.
107. Primary spermatocyte showing nucleus in the diffuse stage.
108. Primary spermatocyte showing early diakinesis.
Figs. 109 and 110. Polar views of metaphase I.

Fig. 111. Side view metaphase I.
112. Early telophase I.
113. Late telophase I. The daughter chromosomal plates reveal four sex-chromosomes.
114. Polar view metaphase II.
115. Side view metaphase II. Three X chromosomes and a Y chromosome moving towards opposite poles.

Plate VII (Prodenia litura)

Fig. 116. Resting spermatogonium.
Fig. 117. Early primary spermatocyte showing nucleus, vesicular mitochondria and crescent-shaped Golgi bodies.

115. Resting primary spermatocyte.

119. Primary spermatocyte showing late prophase.

120. Polar view metaphase I.

121. Side view metaphase I.

122. Telophase I.

123. Polar view metaphase II.

124. Side view metaphase II.

125. Telophase II.

Figs. 126 and 127. Early spermatids showing mitochondrial vesicles aggregating to form a compact mass and a few scattered Golgi bodies.

126 and 129. Spermatids showing mitochondrial nebenkern and a few Golgi bodies collecting near the nucleus.

Fig. 130. Spermatid showing the formation of the acrosomal granule.

131. Spermatid showing the axial filament traversing the mitochondrial nebenkern and the acrosomal granule with a single Golgi body.

132. Spermatid showing differentiation of the nebenkern into outer clear chromophobic and inner darkly staining chromophilic portions.

133. Spermatid showing the disappearance of the acrosomal vesicle and the elongation of the mitochondrial nebenkern.

134. Spermatid showing the appearance of the 'central substance' granules in the chromophobic area of the nebenkern.

Figs. 135 and 136. Spermatids showing massive acrosome in close contact with the nucleus, extruded chromophilic core and
a few Golgi bodies in the tail region.

Plate VIII (Prodenia litura)

Figs. 137-141. Spermatids showing the progressive development and elongation of the acrosome.

Figs. 142 - 153 (Under Phase contrast)

Fig. 142. Resting spermatagonium.
" 143. Resting primary spermatocyte showing vesicular mitochondria and Golgi bodies.
" 144. Primary spermatocyte. Very late prophase.
" 145, 146. Telophase II showing the spindle fibres and almost equal distribution of the mitochondria and the Golgi bodies.
" 147. Early spermatid showing the compact mitochondrial mass. Spherical Golgi bodies and the spindle fibres remain.
" 148. Spermatid showing a few Golgi bodies collecting in the vicinity of the nucleus.

Figs. 149 and 150. Spermatids showing the condensation of the mitochondrial nebenkern and the formation of the acrosomal granule.

Fig. 151. Elongating spermatid showing the acrosome and the appearance of the 'central substance' granules in the chromophobic area of the nebenkern.

Figs. 152 and 153. Spermatids showing the extrusion of the chromophilic substance of the nebenkern and a few Golgi bodies in the tail region.
Plate IX (Anaphabis sp.)

Fig. 154. Spermatogonium showing vesicular mitochondria and a few Golgi granules.

Fig. 155. Spermatogonium before the growth period.

Fig. 156. Primary spermatocyte.

Fig. 157. Resting primary spermatocyte.

Fig. 158. Telophase I showing mitochondria, faintly staining spindle fibres and two rod-like centrioles on either side of the spindle.

Fig. 159. Newly formed secondary spermatocyte.

Fig. 160. Telophase II.

Fig. 161. Earliest spermatid.

Fig. 162. Early spermatid showing the formation of the mitochondrial nebenkern.

Figs. 163 and 164. Spermatids showing differentiation of the mitochondrial nebenkern and a few Golgi bodies in the form of granules and crescents.

Fig. 165. Spermatid showing the appearance of the 'central substance' granules in the chromophobie cavity of the nebenkern and the aggregation of the Golgi bodies in the formation of the acrosome.

Figs. 166 - 171. Spermatids showing the elongation of the nebenkern and the gradual dwindling of the chromophilic substance. The growth in size of the acrosomal granule can also be studied.
Figs. 172 - 178. Spermatids showing the later development stages of the acrosome.

179 - 181. Transverse sections, spermatid tail showing the 'central substance' granules in the partitioned chromophobic cavity of the nebenkern.

Plate X (Chrotogonus sp.)

Fig. 182. Spermatogonium showing juxta-nuclear mass of undifferentiated cytoplasmic granules.

183. Resting primary spermatocyte showing bigger deeply-staining Golgi bodies and numerous smaller mitochondrial granules.


185. Primary spermatocyte. The mitochondrial granules joining to form threads. Golgi bodies have grown into spheres.

Figs. 186 and 187. Primary spermatocytes. The mitochondria are clumping together.

Fig. 188. Primary spermatocyte showing the formation of tetrads. Two mitochondrial masses can be seen also.

189. Polar view metaphase I. A U-shaped sex-chromosome can be seen towards the right side.

190. Side view metaphase I showing two deeply-staining centrioles at the pole of the fibrillar spindle (Bouin's)

Figs. 191 and 192. Late telophase II showing deeply-staining mitochondria, spindle fibres and few Golgi spheres. Midbody granules are visible in the region of the spindle fibres.
Fig. 193. Newly-formed secondary spermatocyte.

" 194. Secondary spermatocyte.

" 195. Early telophase II.

" 196. Telophase II.

Figs. 197 and 198. Early spermatids showing few Golgi spheres and the fusion of the mitochondria.

" 199 and 200. Spermatids showing faintly-staining nucleus and deeply-staining mitochondrial nebennkern.

Fig. 201. Spermatid. The nebennkern gets divided up into two (Bouin's).

" 202. Drawn out spermatid.

" 203. Spermatid showing the appearance of the acrosomal granule amongst the Golgi bodies.

Plate XI (Chrotogonus sp.)

Figs. 204 - 208. Spermatids showing the progressive thinning out of the mitochondrial nebennkern and the movement of the acrosomal granule around the nucleus.

Fig. 209. Late spermatid.

" 210. Late spermatid showing triangular acrosome at the apex of the nucleus. Centriole shows sign of duality. Number of Golgi bodies can be seen in the tail region.

" 211. Late spermatid showing deeply-staining acrosome and two centrioles at the base of the nucleus.

Figs. 212 - 214. Very late spermatids.

Fig. 215. Almost mature sperm showing deeply-staining sperm head and two rod-like centrioles forming the middle-piece.
Plate XII (Chromosomes sp.)

Under Phase contrast microscope.

Fig. 216. A cyst containing four spermatogonial cells.

" 217. Primary spermatocyte.

" 218. Primary spermatocyte showing clumped up mitochondria and Golgi spheres.

Figs. 219 and 220. Telophase II.

Fig. 221. Late telophase II.

" 222. Early spermatid.

Figs. 223 - 225. Spermatids showing progressive stages in the differentiation of the mitochondrial nebekern.

" 226 - 228. Late Spermatids.

Fig. 229. Much elongated sperm head showing apical acrosome and basal centrosomal area.

" 230. Immature sperm. The tail is studded with tail vesicles.

Plate XIII (Neurobasis sp.)

Fig. 231. Spermatogonia showing cytoplasmic granules and deeply staining nucleolus in the interior of the nucleus.

" 232. Early primary spermatocyte revealing vesicular mitochondria and deeply staining discrete Golgi granules.

" 233. Fully grown primary spermatocyte.

Figs. 234 and 235. Late telophases II showing filamentous mitochondria and a few Golgi bodies.

Fig. 236. Earliest spermatid.

" 237. Spermatid.

Figs. 238 and 239. Spermatids. The mitochondrial nebekern is in the process of making.
Figs. 240 and 241. Spermatids showing condensed mitochondrial nebenkern and the Golgi granules in close vicinity to the nucleus.

" 242 and 243. Spermatids showing mitochondrial nebenkern, the acrosomal vesicle and the two Golgi granules.

" 244 - 247. Spermatids showing the movement of the acrosomal vesicle along with the acrosomal granule.

Fig. 248. Late spermatid showing the acrosome in close contact with the nucleus and the axial filament is seen piercing the mitochondrial nebenkern right through its centre.

Figs. 249 - 251. Very late spermatids showing drawn out nebenkern and the acrosome.

" 252 and 253. Very late spermatids showing apical deeply-staining acrosome. The nucleus has also elongated.

Fig. 254. Immature sperm.

Plate XIV (Labidura repparia)

Fig. 255. Spermatagonium. Two deeply-staining Golgi granules are clearly seen.

" 256. Polar view spermatogonial metaphase showing fourteen chromosomes.

Figs. 257 and 258. Primary spermatocytes. The mitochondria and the Golgi bodies are distributed in the form of threads and granules respectively.

Fig. 259. Polar view metaphase I.

" 260. Side view metaphase I.

" 261. Early telophase I.
Fig. 262. Late telophase I.

" 263. Secondary spermatocyte showing filamentous mitochondria and Golgi granules.

" 264. Polar view metaphase II.

" 265. Side view metaphase II.

" 266. Early telophase II.

Figs. 267 and 268. Late telophases II.

Figs. 269 and 270. Early spermatids showing mitochondrial nebenkern, faintly-staining nucleus and discrete Golgi bodies.

Plate XV (Labidura repara)

Fig. 271. Spermatid.

Figs. 272 and 273. Drawn out spermatids. The mitochondrial nebenkern shows elongation and the Golgi bodies start fusing together.

Fig. 274. Spermatid showing elongated nebenkern and an acroblast.

" 275. Spermatid. The acroblast has differentiated into an acrosomal vesicle and the acrosomal granule.

Figs. 276 and 277. Spermatids. The acrosomal vesicle and the acrosomal granule moving in the vicinity of the nucleus.

Fig. 278. Late spermatid.

" 279. Late spermatid. The acrosomal granule separates from the acrosomal vesicle.

" 280. Spermatid showing acrosome in close contact with the nucleus.

" 281. Immature sperm. (F.W.A. smear).
EXPLANATION OF MICROPHOTOGRAPHS

Three microphotographs are of the fresh testicular cells of *Chrotogonius sp.*, studied under the Phase contrast microscope.

No. 1. — Primary spermatocyte showing clumped up mitochondria and Golgi spheres.

No. 2. — Early telophase of second meiosis. The chromosomes have reached the poles and the mitochondria are seen at one edge of the spindle.

No. 3. — Spermatid showing the differentiation of the mitochondrial nebenkern into outer chromophobic and inner chromophilic areas.