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## WINTER HABITS OF CARABID BEETLES (COLEOPTERA: CARABIDAE)

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In this paper, the winter habits of 123 species of Carabidae from southern Québec are given.

From 1961 to 1973, I have studied in the field the winter habits of many species of carabid beetles from southern Québec. All insects were represented in the adult stage and were motionless. Some species of the genera *Agonum*, *Brachinus*, *Calathus*, *Chlaenius* and *Pterostichus* appeared to be gregarious in hibernation. In one instance, I was surprised to observe different species congregated even with wood-lice in a living "ball". Small carabid beetles prefer hibernating at the surface of the soil while larger ones may burrow down to twenty inches. According to my experience, these insects quit their summer habitats for winter quarters situated at a few feet to a hundred feet away. Then, they often choose higher, dryer and preferably sandy areas. In fact, any mound near their summer habitats is a favorite shelter.

In the list below winter quarters have been indicated with specific abbreviations: A. on mounds, B. in mounds, C. in rotten stumps, D. in rotten standing trees, E. at the foot of a stump, F. under fallen trees, G. in woods, under stones or vegetal debris, H. along edges of wooden areas, I. in a hedge of hawthorn, J. in swampy areas, in clumps of moss and grass, K. in a field, under stones or dead leaves, L. in a field, in thawing time.

For each species, I have indicated in parentheses the number of specimens found in each winter quarter. In addition, a number immediately following a parenthesis gives the depth to which the specimen was found below the surface.

### SPECIES ACCOUNTS

- Acupalpus carus* LeConte.—Nov. 15-27. A (2), F (1), J (1); *pauperculus* Dejean.—Dec. 31. K (2); *pumilus* Lindroth.—Nov. 27-Dec. 11. A (3); *rectangulus* Chaudoir.—Nov. 27. A (2).
- Agonum anchomenoides* Randall.—Nov. 4-Dec. 13. A (5); *canadense* Goulet.—Nov. 10-26. A (2); *cupripenne* Say.—Nov. 6-Jan. 2. A (1), B (2) 4", I (2), L (1); *decentis* Say.—Nov. 4-Dec. 12. A (1), C (5); *gratiosum* Mannerheim.—Gregarious. Nov. 4-Dec. 11. A (37), B (3) 5", C (16); *harrisi* LeConte.—Nov. 11-27. A (5); *lutulentum* LeConte.—Nov. 4-Dec. 12. A (15); *melanarium* Dejean.—Gregarious. Nov. 4-Feb. 13. A (133), B (8) 14", C (1), H (3); *muelleri* Herbst.—Oct. 29. G (1); *palustre* Goulet.—Nov. 19-Feb. 12. A (81); *placidum* Say.—Gregarious. Nov. 5-March 14. A (133), B (19) 6", G (3), H (1); *propinquum* Gemminger and Harold.—Gregarious. Nov. 4-March 11. A (29), B (9) 6", C (1); *puncticeps* Casey.—Gregarious. Nov. 4-Feb. 13. A (169), B (4) 5", C (1); *retractum* LeConte.—Nov. 12. C (7); *sordens* Kirby.—Nov. 4-Feb. 2. A (32), B (2) 1", H (6); *thoreyi* Dejean.—Nov. 6-March 3. A (2), B (1) 1", G (1), H (5); *trigeminum* Lindroth.—Nov. 26. A (1).
- Amara aenea* DeGeer.—Nov. 8-Jan. 6. A (2), B (14) 3", I (1) 2", L (1); *angustata* Say.—Nov. 20-Dec. 31. A (1), L (1); *apricaria* Paykull.—Dec. 31. L (2); *cupreolata* Putzey.—Nov. 20. A (1); *familiaris* Duftschmid.—Dec. 31. L (1); *obesa* Say.—Nov. 20. A (1); *pallipes* Kirby.—Dec. 31. L (2); *patruelis* Dejean.—Nov. 8-Dec. 31. A (4), K (1), L (2); *rubrica* Haldeman.—Nov. 10-March 11. A (1), B (3).
- Anisodactylus discoideus* Dejean.—Nov. 10-27. B (3) 6"; *harrisi* LeConte.—Nov. 11-26. B (1) 6", G (1), H (6); *interstitialis* Say.—Nov. G (3); Nov. 8. A (2); *kirbyi* Lindroth.—Nov. 10-27. B (4) 6", F (1); *nigrita* Dejean.—Nov. 27-March 14. B (4) 6", H (1); *sanctaecrucis* Fabricius.—Nov. 4-Dec. 31. A (2), B (2) 2", L (1).
- Anisotarsus terminatus* Say.—Nov. 11. H (1).

- Badister grandiceps* Casey.—Dec. 11. B (1) 1"; *neopulchellus* Lindroth.—Nov. 10. B (1); *notatus* Haldeman.—Nov. 19-Dec. 11. A (4), B (1) 1"; *obtusus* LeConte.—March 4. A (2).
- Bembidion castor* Lindroth.—Nov. 10-March 11. A (39), B (1) 1"; *chalceum* Dejean.—Nov. 27. A (1); *concretum* Casey.—Nov. 19-Feb. 12. A (10); *fortestriatum* Motschulsky.—Dec. 11. A (1); *frontale* LeConte.—Nov. 19-Feb. 13. A (25). Most of these insects were lying upside-down under dead leaves; *graciliforme* Hayward.—Nov. 10-Feb. 2. A (13); *incrementum* LeConte.—Nov. 27. A (1); *intermedium* Kirby.—Nov. 27. A (2); *minus* Hayward.—Nov. 1-Jan. 2. A (2), I (2), J (1); *muscicola* Hayward.—Nov. 10-Dec. 12. A (4), C (1), J (2); *nitidum* Kirby.—Oct. 10-March 11. B (9) 4", H (3), K (1); *obscurum* Motschulsky.—Nov. 8. A (1); *patruale* Dejean.—Nov. 4-March 11. A (37), B (5) 1", J (1); *praticola* Lindroth.—Oct. 13-Nov. 10. J (2); *quadrinaculatum* oppositum Say.—Nov. 4-March 3. A (5), B (3) 6", I (1), M (1); *salebratum* LeConte.—Nov. 4. A (1); *semicinatum* Notman.—Nov. 3. J (1); *tetracolum* Say.—Nov. 8. A (1); *versicolor* LeConte.—Nov. 4-Jan. 6. A (3), I (1) 3".
- Brachinus cyanochroaticus* Erwin.—Gregarious. Nov. 20-Dec. 11. B (28) 10"; *medius* Harris.—Gregarious. Nov. 20-Dec. 11. B (18) 15"; *tenuicollis* LeConte.—Gregarious. Nov. 20. B (3) 10".
- Bradycellus atrimegeus* Say.—Nov. 11-Dec. 11. A (1), B (17) 4"; *badipennis* Haldeman.—Nov. 11-19. A (2); *congener* LeConte.—Nov. 4-8. A (7); *kirbyi* Horn.—Dec. 10-Feb. 12. A (6); *nigriceps* LeConte.—Nov. 27-Feb. 11. A (2); *nigrinus* Dejean.—Nov. 27. A (1); *rupestris* Say.—Nov. 4-Dec. 11. A (10), B (3) 8".
- Calathus gregarius* Say.—Gregarious. Nov. 4-Dec. 11. A (4), B (5) 14", H (1).
- Calleida punctata* LeConte.—Nov. 4-March 14. A (1), G (1), I (2).
- Carabus granulatus* Linné.—Nov. 4. C (3), D (1).
- Chlaenius emarginatus* Say.—Oct. 25. G (1); *impunctifrons* Say.—Nov. 10-Dec. 11. B (15) 6"; *lithophilus* Say.—Nov. 10-Dec. 11. B (6) 6"; *pennsylvanicus* Say.—Nov. 19. A (1); *sericeus* Forster.—Nov. 10-Dec. 11. A (2), B (13) 6"; *tricolor* Dejean.—Gregarious. Oct. 25-Dec. 11. A (1), B (11) 20", H (3).
- Cymindis americana* Dejean.—Nov. B (1) 4", K (3); *cribricollis* Dejean.—Oct. 25-Nov. 3. B (5) 4", G (1).
- Diplocheila obtusa* LeConte.—Oct. 25-Nov. 10. B (12) 3"; H (1).
- Dromius piceus* Dejean.—March 14. G (1).
- Dyschirius globulosus* Say.—Jan. 2-March 14. A (3), H (3), I (15); *integer* LeConte.—March 11. B (1).
- Elaphrus californicus* Mannerheim.—Nov. 20-Dec. 11. A (1), B (1) 2"; *clairvillei* Kirby.—Nov. 4-Dec. 11. A (1), B (4) 6".
- Harpalus affinis* Schrank.—Nov. 8-10. B (8); *bicolor* Fabricius.—Nov. 20-Feb. 11. B (5) 8"; *herbivagus* Say.—Nov. 10-Dec. 4. A (8), B (9), L (2); *pennsylvanicus* DeGeer.—Nov. 8. A (1); *pleuriticus* Kirby.—Nov. 10. B (2).
- Lebia atriventris* Say.—Oct. 24-Nov. 10. A (1), H (1), J (1), K (1); *ornata* Say.—Nov. 12. G (1); *viridis* Say.—Nov. 10. J (1), K (1).
- Loricera pilicornis* Fabricius.—Nov. 10-March 11. A (10), G (1).
- Metabletus americanus* Dejean.—Nov. 10-March 11. A (1), F (2), H (1).
- Microlestes linearis* LeConte.—Nov. 3-Jan. 2. F (1), I (2).
- Notiophilus aquaticus* Linné.—Nov. 14. Two specimens; habitat unrecorded.
- Omophron americanum* Dejean.—Nov. 19. A (1).
- Oodes parallelus* Say.—Nov. 10-Dec. 12. A (1), B (18) 6", H (1), I (3).
- Pseudamara areanaria* LeConte.—Oct. 19-Nov. 3. C (1), F (1), G (1).
- Pterostichus chalcites* Say.—Oct. 23. H (1); *corvinus* Dejean.—Nov. 10-Dec. 12. B (9) 10"; *femorialis* Kirby.—Nov. 10-14. B (1), K (1); *leconteianus* Lutshnik.—Nov. 3-Dec. 11. B (1) 1", I (2); *luctuosus* Dejean.—Gregarious. Nov. 4-Dec. 11. A (5), B (17) 20", C (4); *lucublandus* Say.—Oct. 25-Dec. 11. A (2), B (20) 6", H (7), K (1); *melanarius* Illiger.—Oct. 25-Nov. 20. B (1) 6", H (1); *mutus* Say.—Oct. 25-March 14. G (4), H (11); *patruelis* Dejean.—Nov. 4-6. A (2), C (1), H (2); *pennsylvanicus* LeConte.—Oct. 25-Nov. 12. C (1), H (1); *scrutator* LeConte.—Nov. 10-20. B (20) 15".

- Selenophorus gagatinus* Dejean.—Oct. 28. K (4).  
*Sphaeroderus lecontei* Dejean.—Nov. 16. D (1), E (1); *nitidicollis brevoorti* LeConte.—Nov. 16-21. E (2), H (2).  
*Stenolophus comma* Fabricius.—Nov. 10-Dec. 11. A (2), B (11) 7"; *conjunctus* Say.—Nov. 10-March 3. A (6), B (5) 3", H (1), J (1), K (1); *fuliginosus* Dejean.—Oct. 25-March 11. A (9), B (7), H (1), J (1); *ochropezus* Say.—Nov. 4 A (1).  
*Tachys laevus* Say.—Nov. 10-Jan 6. I (3), J (4); *obliquus* Casey.—Nov. 19. A (1).  
*Trichocellus cognatus* Gyllenhal.—Nov. 10-March 3. A (7), B (4) 3".

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