

SPECIES FACT SHEET

Common Name: Roth's blind ground beetle

Scientific Name: *Pterostichus rothi* Hatch 1951

Synonyms: *Anilloferonia rothi* Hatch 1951

Phylum: Arthropoda

Class: Insecta

Order: Coleoptera

Family: Carabidae

Type Locality: Oregon, Benton County, Mary's Peak, August 1949, V. Roth col.

OR/WA BLM and FS Region 6 Units where Suspected or Documented:

BLM: Mary's Peak Resource Area (documented).
Salem District (documented).

USFS: Siuslaw National Forest (documented).



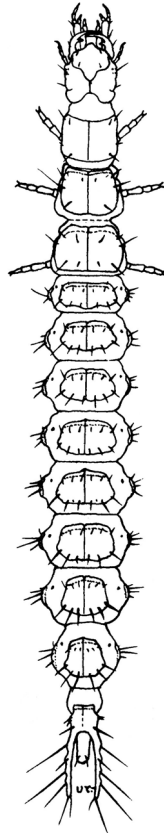
**Lateral view of *Pterostichus rothi* Hatch 1951.
Digital image by Pacific Analytics, LLC 2005.**

Description:

Roth's Blind Carabid, *Pterostichus rothi* Hatch, is an eyeless and flightless soil-dwelling beetle. The beetles are 8 to 9 mm in length with an elongate shape. They are shiny, pale brownish-orange to reddish brown in color, with parallel elytra (wing covers) and a large head relative to the thorax.

Life History:

Immature carabid beetles hatch from eggs and begin to feed soon after. They go through several instars, finally entering a pupal stage when they undergo metamorphosis. Adults emerge as teneral (not fully sclerotized) and remain in that condition for several hours, sometimes for days.



General habitus of an immature *Pterostichus* beetle (Peterson 1960).

Carabid beetles are often predaceous as larvae and adults, although some species are known to consume seeds and other plant parts. The natural diet of *Pterostichus rothi* is unknown. Individuals reared in captivity consumed only small whole insects of various life stages, and larger insects that were crushed or damaged (LaBonte 1993). Thus *Pterostichus rothi* appears to be a generalist predator of soil invertebrates.

Quantitative phonological data for *Pterostichus rothi* is not available, but collection records indicate a bimodal activity cycle. The primary peak is from October through January, with a secondary peak in May and June. This bimodal cycle is likely the result of convenient collecting opportunities. The true abundance (activity) curve probably reaches a peak in October through March or April and then gradually declines during the hottest months of the year. Adults are most active during cooler months, seeking refugia as temperatures increase the soil

becomes dry (LaBonte 1993). The phenology of the immature stages of *Pterostichus rothi* is unknown.

Range, Distribution, and Abundance:

Pterostichus rothi has been collected at four localities in Oregon. Specific localities include:

- 1) Benton Co., Mary's Peak, 1100 m, forest campground on north slope (SE $\frac{1}{4}$ Sec19 T12S R7W; NE $\frac{1}{4}$ Sec20 T12S R7W; SW $\frac{1}{4}$ Sec20 T12S R7W; Sec21 T12S R7W). These sites were in forests on the north face of Marys Peak and along the upper reaches of Parker Creek Ravine extending from below the old campground to above the headwaters of Parker Creek.
- 2) Benton Co., Grass Mountain, 976-1083 m, ~9.5 km NW of Alsea (SW $\frac{1}{4}$ Sec21 T13S R8W). J.R. LaBonte, coll.
- 3) Benton Co., Alsea Fish Hatchery, 122-183 m (?), ~5 km NE of Alsea (Sec20 T13S R7W), L. Russell, coll..
- 4) Lincoln Co., Schooner Creek, 15-46 m, private ownership. Site is ~3.2 km east of the south end of Lincoln City at milepost 2 on the north side of Schooner Creek Road (NE $\frac{1}{4}$ Sec25 T7S R11W). J.R. LaBonte, coll. This site has been clear-cut since the 1993 survey and the status of *Pterostichus rothi* at this locality is unknown.

A survey was conducted for *Pterostichus rothi* in 1993 (LaBonte 1993). The survey sampled at eight localities in the northern Oregon Coast Range from High Peak in Tillamook Co. south to Windy Peak in Lane Co. Specimens were found at only 2 localities (mentioned above). The species may occur at other sites within the known range, but access difficulties prevent sampling (LaBonte pers. com. 2005).

Observations indicate that this species occurs in highly clumped colonies (Labonte 1993). *Pterostichus rothi* appear to have aggregated populations with several individuals found under the same rock or log (LaBonte 1993). This clumped distribution is likely due to precise microhabitat selection, and/or limited dispersal capabilities (LaBonte 1993).

rocks would not be susceptible to movement. On Marys Peak, these sites were within closed-canopy mature forest stands predominantly of noble fir (*Abies procera* Rehd.) and western hemlock (*Tsuga heterophylla* Sarg.) with sparse shrubby understory or a dense layer of conifer needles and small branches covering deep moist soil. At the Schooners Creek site the forest was 40 year old closed-canopy western hemlock with sparse understory (LaBonte 1993).

Pterostichus rothi does not appear to occur in open areas, instead preferring sites that receive extensive shading from surrounding trees. The beetles are found under rocks and woody debris deeply imbedded in the soil. The underlying soil is moist and resistant to summer drying (LaBonte 1993). The species appears to prefer cool, moist, closed canopy conifer forests with well-drained, deep, coarse-crumb soil structure (Applegarth 1995). It inhabits only soils that have developed in place, not alluvial soils on floodplains.

Pterostichus rothi are relatively cryothermic, and are more active in temperatures cooler than those preferred by typical epigeal carabids. The species may avoid higher summer temperatures by burrowing deeper into the soil profile (LaBonte 1993). Individuals exhibit normal activity in temperatures as low as 2°C (Applegarth 1995). Specimens have been collected in areas where soil temperatures ranged from 2° to 17°C, with most nearer to 11°C (LaBonte 1993).

Threats:

The *Pterostichus rothi* population appears to be relatively stable. The Marys Peak habitat is not likely to be developed, although future improvements of the old campground could disturb known habitat and care should be taken if any work is considered.

Loss of late-successional forests and coarse woody debris in managed stands could impact the survival of the species. Substantial windthrow can also devastate habitat, opening the canopy and raising the temperature of the exposed ground.

Conservation Considerations:

Trap capture rates of Carabid beetles generally decrease in areas of prescribed burns which may reduce the amount of important plant resources such as seeds (Niwa and Peck 2002). Thinning forests does not have the same impact. Late-successional forests that have been thinned 16-41 years prior to sampling show no difference in total number of Carabid beetles or Carabid species diversity when compared to unthinned forests (Peck and Niwa 2004). For *P. rothi*, it would be important when thinning forests to leave coarse woody debris of

sufficient size as habitat. Prescribed burning may deplete the amount of logs and litter, reducing available *P. rothi* habitat. The presence of large coarse woody debris also may serve as refugia for the species, especially during times of severe drought.

Pterostichus rothi is apparently tolerant of fire and intensive logging. The high elevation stands on Marys Peak burned in the late 1840's. The fire destroyed much of the existing noble fir there. However, *Pterostichus rothi* occur in the regenerated forests that are about 125 years old. Forests at the Schooners Creek site have been clear-cut yet *Pterostichus rothi* has survived there as well. These types of disturbance probably have a smaller impact on *Pterostichus rothi* when they occur in the summer months, the season during which the beetles have burrowed deep below rocks and logs seeking moist soil.

Other pertinent information (includes references to Survey Protocols, etc):

The *Pterostichus rothi* population appears to be relatively stable. The Marys Peak habitat is not likely to be developed, although future improvements of the old campground could disturb known habitat and care should be taken if any work is considered.

Type specimen is in the California Academy of Sciences, San Francisco. Species is named after its collector, Vincent Roth, a former graduate student at Oregon State University, Corvallis, OR.

The best time to survey for *Pterostichus rothi* is during cooler months when it is more likely to see them near or on the soil surface. Searching is the only proven method of finding the beetles. The beetles are found by turning stones and woody debris embedded in the soil. The collector must have a good search image of the species and be quick about searching under the newly turned stone or log as the beetles may burrow into the soil. It is imperative to return the stone or rock to its original position to prevent undue habitat disturbance. A detailed survey protocol is available (LaBonte 1993).

Collected specimens should be preserved in 70% ethyl alcohol, or pinned (see photographs). Specimens should have labels that contain collecting information, State, County, Locality, Habitat, Date, and Collector's name. Optional information that is helpful for future study would be TRS or UTM data, elevation, soil type, moisture content, and temperature, forest composition, and understory plants.

While identification of the species is fairly straightforward, some experience with Carabidae taxonomy is required. *Pterostichus rothi* is the largest blind carabid beetle that occurs in Oregon, therefore a large, blind carabid beetle is likely this species. Expert determination is suggested to confirm field identifications.

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ATTACHMENTS:

- (1) Map of Range and Distribution**
- (2) BLM Distribution Maps**
- (3) Key to Identification of the Species**
- (4) Digital Images**
- (5) List of Pertinent References/Literature**
- (6) Original Published Description**

Hatch, M.H. 1951. Studies on the Coleoptera of the Pacific Northwest IV; Carabidae, Dytiscidae, Gyrinidae. Bulletin of the Brooklyn Entomological Society 46:113-133.

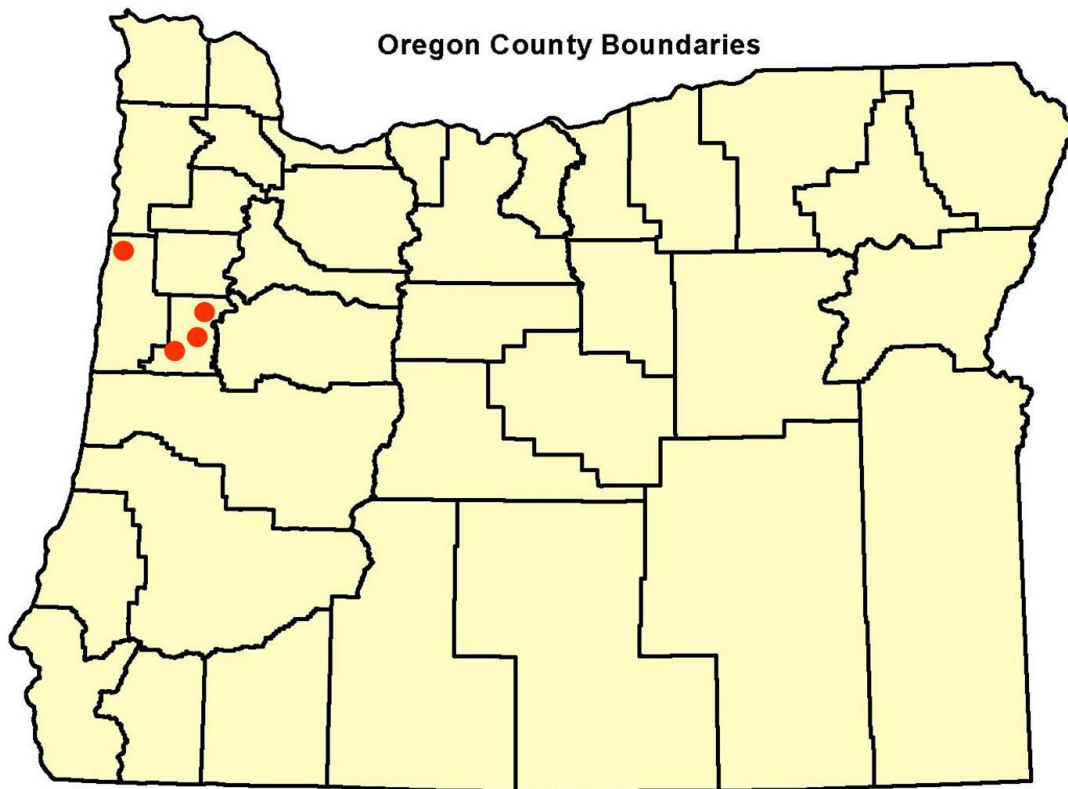
(7) Survey Report

LaBonte, J.R. 1993. Roth's Blind Beetle (*Pterostichus rothi* Hatch: Coleoptera: Carabidae): Habitat, Survey, Threatened and Endangered Status. A Challenge Cost-Share Project funded through the Bureau of Land management and the Nature Conservancy's Oregon Natural Heritage Program. 49 pages.

Preparer:

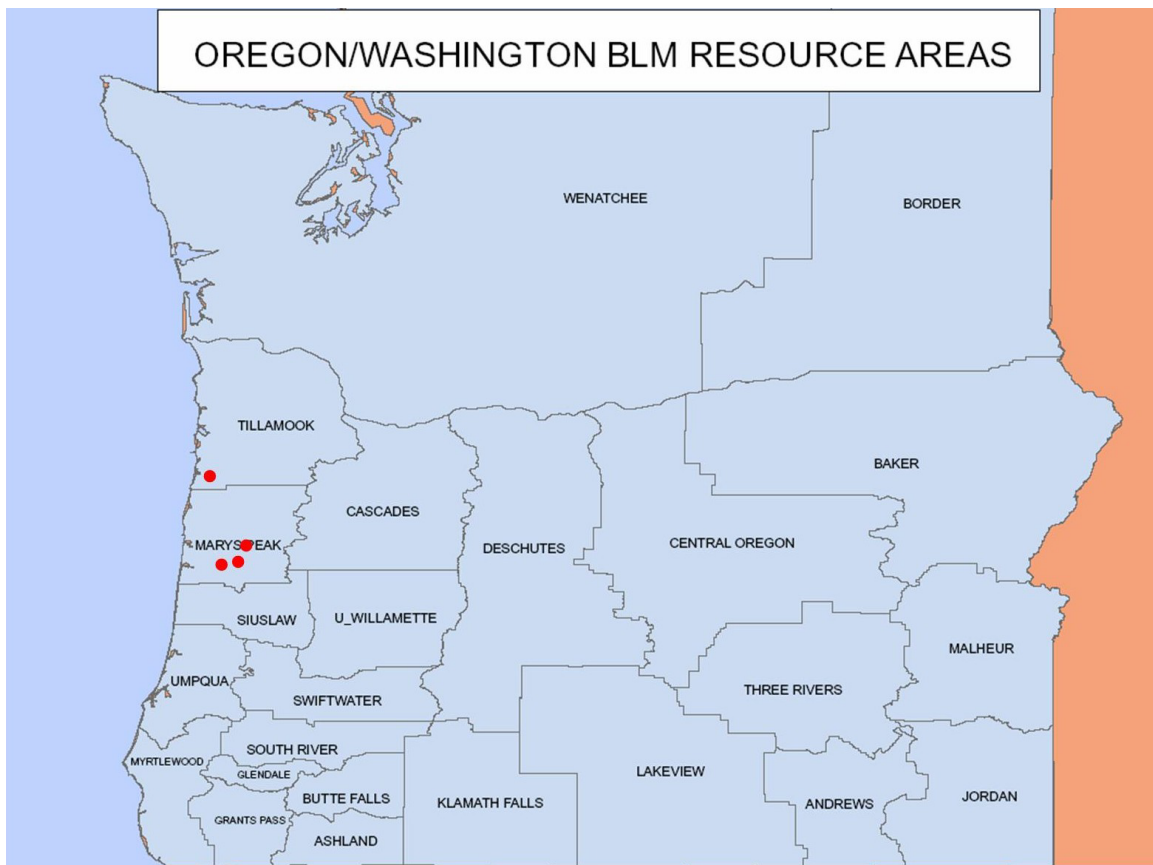
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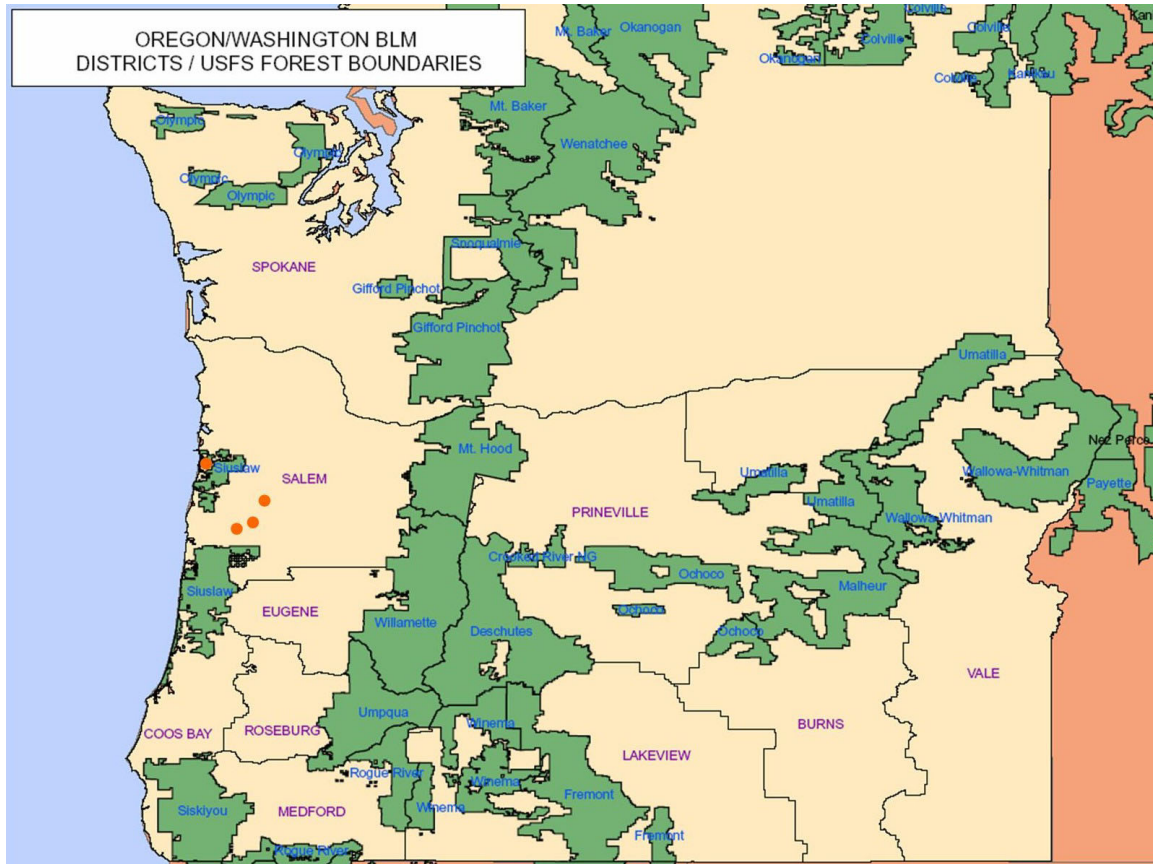


Distribution map for *Pterostichus rothi* Hatch 1951.

BLM Distribution Maps

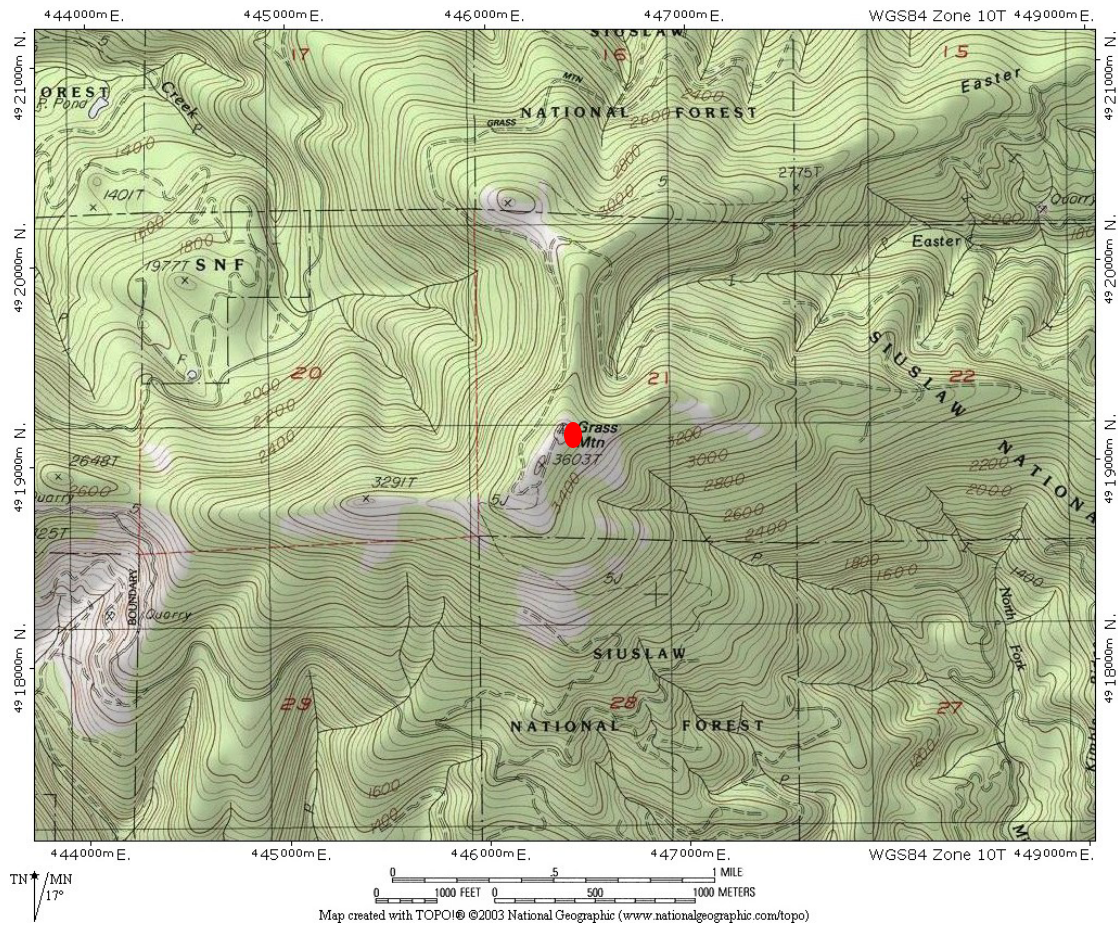


**Map of BLM Resource Areas and
recorded distribution of *Pterostichus rothi* Hatch.**

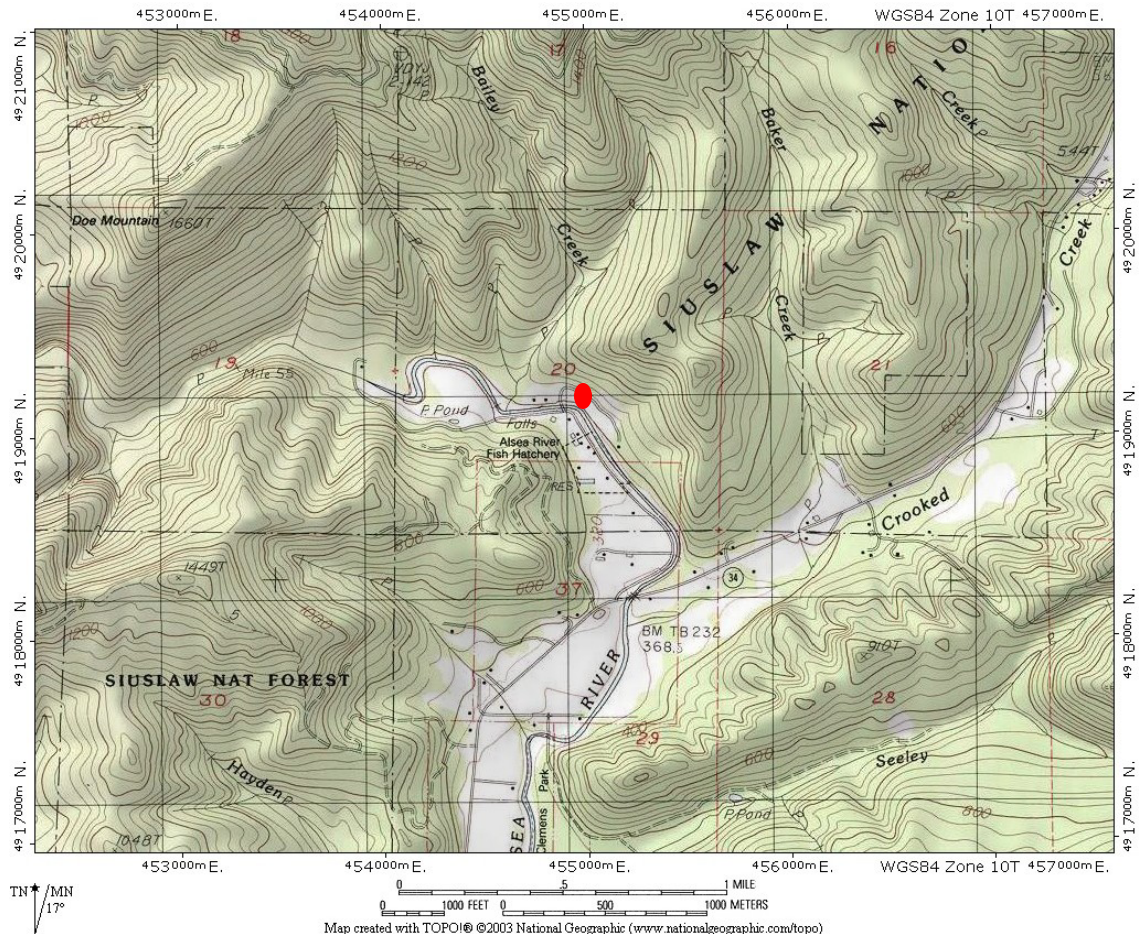


**Map of BLM Districts/USFS Forests and
recorded distribution of *Pterostichus rothi* Hatch.**

Other Locality Maps

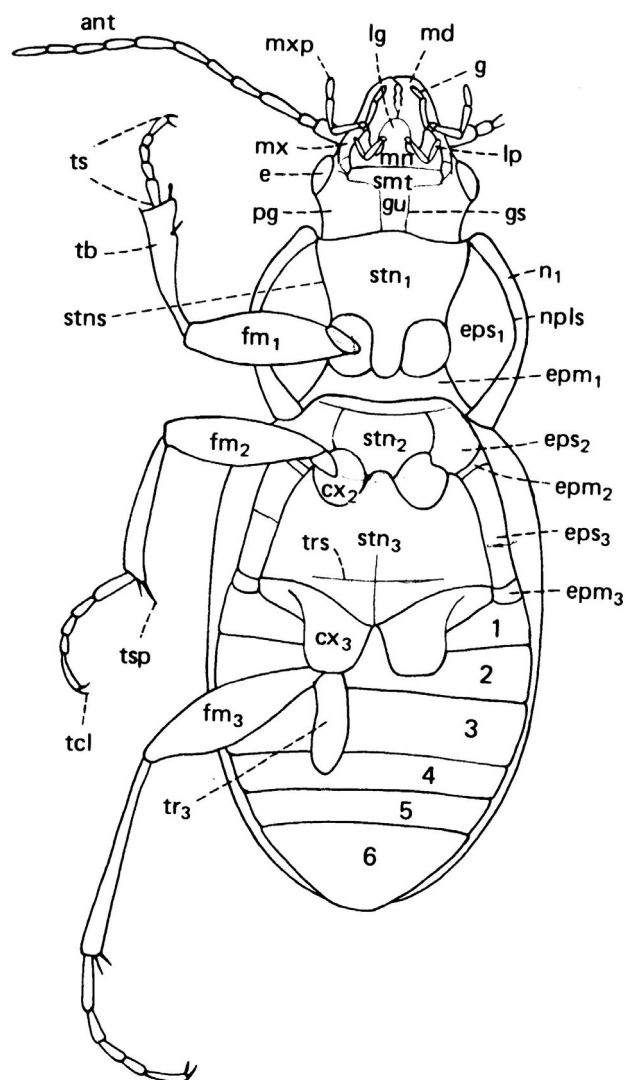


Approximate Grass Mountain locality of *Pterostichus rothi* Hatch.



Approximate Alsea Fish Hatchery locality of *Pterostichus rothi* Hatch.

Identification Key From Hatch 1953



Ventral view of a ground beetle
(*Omaseus* sp.). *ant*, antenna; *cx*, coxa; *e*, compound eye; *epm*₁, proepimeron; *epm*₂, mesepimeron; *epm*₃, metepimeron; *eps*₁, proepisternum; *eps*₂, mesepisternum; *eps*₃, metepisternum; *fm*, femur; *g*, galea; *gs*, gular suture; *gu*, gula; *lg*, ligula; *lp*, labial palp; *md*, mandible; *mn*, mentum; *mx*, maxilla; *mxp*, maxillary palp; *n*₁, pronotum; *npls*, notopleural suture; *pg*, postgena; *smt*, submentum; *stn*₁, prosternum; *stn*₂, mesosternum; *stn*₃, metasternum; *stns*, prosternal suture; *tb*, tibia; *tcl*, tarsal claws; *tr*, trochanter; *trs*, transverse suture on metasternum; *ts*, tarsus; *tsp*, tibial spurs; 1-6, abdominal sterna.

Anilloferonia VanD.

Testaceous to rufous; body parallel; antennae extending beyond base of pronotum; pronotum nearly as wide as long, the sides feebly arcuate with a setiferous puncture in front of middle and towards the distinct hind angles, the basal impressions single and linear; elytra with nine impressed and very finely and not closely punctate striae, basal and dorsal elytral punctures absent; hind wings absent; prothorax with side pieces punctate; metepisternum as wide as long; males with the three basal segments of the protarsus broader than in female, each with a pair of whitish scalelike appendages beneath; male with one and female with two anal setae along the posterior margin of the last abdominal sternite on either side of the middle.

The four forms so far known are allopatric and may constitute a single polytypic species.

- 1 Pronotum more convex, the side margins more strongly arcuately convergent in front, the apex at least slightly narrower than the base, the anterior angles less prominent, the basal impressions punctate, the anterior transverse impressions evanescent; eye reduced to a minute white rudiment behind the antenna; side pieces of mesosternum and metasternum and first two abdominal sternites somewhat punctate; length 5-6 mm.
- 2 Elytra with scutellar stria, the humeri scarcely dentate; pronotum more strongly narrowed in front, the apex about five-sixths as wide as the base, the sides evidently arcuate in front, behind evanescently broadly sinuate before the slightly obtuse hind angles; rufous, the appendages testaceous; 6.1 mm.; sw Or.; under log MALKINI sp. n.
- 2' Elytra without scutellar stria, the humeri strongly dentate; pronotum less narrowed in front, the apex about nine-tenths as wide as the base
- 3 Pronotum with the sides before the slightly obtuse hind angles virtually oblique; testaceous; 5.5 mm.; sw Wn. (Cal. Acad.), nw Or. (MCZ); under logs in forest; at 4000 ft. on Mt. Adams, at 5000 ft. on Mt. Hood TESTACEA VanD.
Van Dyke 1926:116 (2). Hatch 1935:116 (2).
- 3' Pronotum with the sides before the hind angles somewhat extensively subparallel in about basal sixth and thence feebly broadly sinuate behind the somewhat variably arcuate distal portion, the hind angles narrowly rectangularly to subacutely rounded; rufotestaceous, the appendages slightly paler; 5-6 mm.; nw Or.; in small rodent tunnels under twelve or fourteen inch logs sunk two-thirds of their diameter in the damp forest floor of a deserted lumber camp at sea level (Pl. XXII, fig. 4) LANEI Hatch
Hatch 1935:115-118 (4).
- 1' Pronotum more depressed, the side margins less strongly arcuately convergent in front, the apex wider than the base, the anterior angles more prominent, the basal impressions and entire pronotum impunctate, the anterior transverse impression distinct; white eye rudiments entirely absent; mesosternum with side pieces punctate anteriorly, the side pieces of the metasternum and the first two abdominal sternites impunctate; pronotum with hind angles narrowly subacutely rounded in front of which the side margin is slightly sinuate; elytra with humeri dentate, the scutellar stria absent; female alone known; 8.25 mm.; nw Or. (Marys Peak--a single female, Cal. Acad.) ROTH Hatch
Hatch 1951:117 (4).

**Digital Pictures
By Pacific Analytics, LLC**

**These images are available and can be used by the BLM.
Please acknowledge photographs are Pacific Analytics, LLC 2005.**



**Dorsal view of *Pterostichus rothi* Hatch 1951.
Digital image by Pacific Analytics, LLC 2005.**



**Dorsal view of *Pterostichus rothi* Hatch 1951.
Digital image by Pacific Analytics, LLC 2005.**



**Lateral view of *Pterostichus rothi* Hatch 1951.
Digital image by Pacific Analytics, LLC 2005.**



**Dorsal view of *Pterostichus rothi* Hatch 1951.
Digital image by Pacific Analytics, LLC 2005.**



**Lateral view of *Pterostichus rothi* Hatch 1951.
Digital image by Pacific Analytics, LLC 2005.**



**Lateral view of *Pterostichus rothi* Hatch 1951.
Digital image by Pacific Analytics, LLC 2005.**

References

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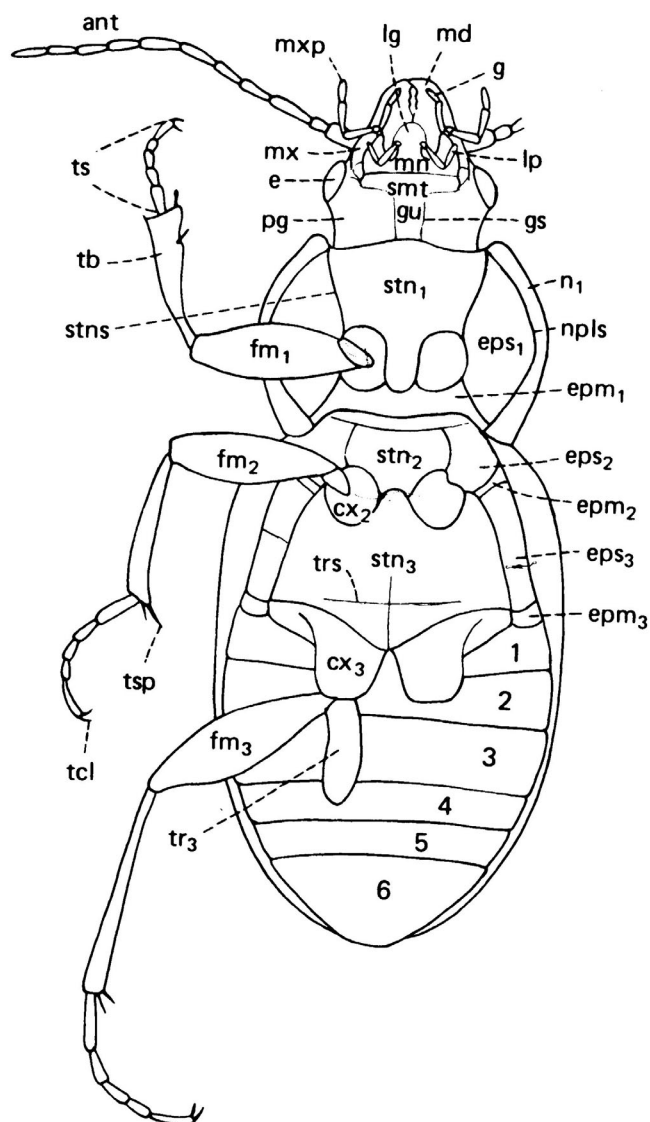
Van Dyke, E.C. 1926. Certain peculiarities of the coleopterous fauna of the Pacific Northwest. Annals of the Entomological Society of America 19(1):1-12.

Technical Description:

See diagram on next page.

Testaceous; parallel; eyes wanting; pronotum somewhat flattened, impunctate, about nine-tenths as long as broad, the base about nine-tenths as wide as the apex which is about five-sixths as wide as the pronotum at its widest, the sides feebly arcuate in front, slightly sinuate in front of the narrowly arcuate rounded hind angles, the anterior angles prominent, the sides with a single setiferous puncture in front of the middle and one towards the hind angles, the basal impressions single linear and impunctate, the hind angles flattened, the anterior and posterior transverse impressions distinct, the median line extending from the anterior transverse impression nearly to the base; elytra with nine impressed and very finely and not closely punctate striae, scutellar stria and basal and dorsal punctures absent, the marginal stria with very widely separated apical and basal series each about six setiferous punctures, the humeri strongly dentate, the apex of each elytron separately rounded and feebly sinuate before the minutely rectangular sutural angle; hind wings apparently absent; pro- and mesothorax below with side pieces punctuate anteriorly; the sidepieces of the metathorax and the abdomen impunctate; female with protarsi narrow, the last abdominal sternite with two setiferous punctures on either side along the posterior margin; length 8.25 mm.

Distinguished from other species of blind *Pterostichus* by its larger size and its more depressed impunctate pronotum, the apex wider than the base, the anterior transverse impression distinct.



Ventral view of a ground beetle
(*Omaseus* sp.). *ant*, antenna; *cx*, coxa; *e*, compound eye; *epm*₁, proepimeron; *epm*₂, mesepimeron; *epm*₃, metepimeron; *eps*₁, proepisternum; *eps*₂, mesepisternum; *eps*₃, metepisternum; *fm*, femur; *g*, galea; *gs*, gular suture; *gu*, gula; *lg*, ligula; *lp*, labial palp; *md*, mandible; *mn*, mentum; *mx*, maxilla; *mxp*, maxillary palp; *n*₁, pronotum; *npls*, notopleural suture; *pg*, postgena; *smt*, submentum; *stn*₁, prosternum; *stn*₂, mesosternum; *stn*₃, metasternum; *stns*, prosternal suture; *tb*, tibia; *tcl*, tarsal claws; *tr*, trochanter; *trs*, transverse suture on metasternum; *ts*, tarsus; *tsp*, tibial spurs; 1–6, abdominal sterna.

Taxonomic Diagram of a Ground Beetle (Borror *et al.*, 1989)