

Randall Morgan
3500 North Main St.
Soquel, CA 95073

12 February 1993

U.S.F.W.S. Regional Office
Eastside Federal Complex
911 NE 11th Ave.
Portland, Oregon 97232-4181


RE: Ohlone Tiger Beetle

I hereby petition the U.S. Fish and Wildlife Service to list *Cicendela* n.sp. (Ohlone Tiger Beetle) as an endangered species under the federal Endangered Species Act. A manuscript by Richard Freitag, David Kavanaugh and R. Morgan describing the morphology, habitat and range of this beetle has been submitted for publication (copy enclosed). Initial taxonomic judgements of Drs. Freitag and Kavanaugh were that this form was distinct from *C. purpurea* at least at the subspecific level based on external morphology and phenology. Later examination of male and female genitalia convinced them that it deserved specific rank.

This species is known only from three locations within a radius of approximately three miles in Santa Cruz County California. Habitat requirements appear to be very specialized and limited in extent. Two of the three populations are currently threatened by proposed residential developments, particularly the type locality in Soquel. The third population is subject to mortality caused by the increasingly heavy bicycle traffic along the trail where the adult beetles congregate.

More detailed information on habitat, occurrences and threats can be found in the enclosed manuscript, map and letters. Please contact me if necessary at (408)475-2212 or at the above address.

Sincerely,


R. Morgan

cc: Ventura Field Office

FEB 18 1993

U.S. FISH AND WILDLIFE SERVICE
RECEIVED
CB

Randall Morgan
3500 N. Main St.
Soquel, CA 95073

2 July 1992

Christopher D. Nagano
U.S. Fish & Wildlife Service
2800 Cottage Way, Room E-1823
Sacramento, CA 95825

Re: Santa Cruz County endemic *Cicindela*

Dear Chris,

Here is the information you requested on the recently discovered tiger beetle in Santa Cruz County. The enclosed map shows all collection localities known to me of the two local species (and I would be interested to hear if you are aware of others). The three numbered locations are the only places where the endemic form has been found so far. I first noticed these beetles in 1990 above Winkle Ave. near Soquel (#1). In 1991 and 1992 I searched a number of other similar-appearing habitats and found two additional populations near Santa Cruz (#2 & 3). Several potential habitats in the area have yet to be checked.

Habitat requirements seem to be fairly narrow. All three populations are in remnant stands of open native grassland with *Danthonia californica* and *Stipa pulchra*, on level or nearly level sites with a poorly-drained pale clay or sandy clay soil which bakes very hard after the winter rains cease, and where the grass is low and sparse enough to allow for some bare ground (trails and trampled areas seem to be attractive). Two plants which may be useful as "indicator species" are *Perideridia gairdneri* and *P. kelloggii*. Both of these are uncommon in the region, but one or both are present at each of the three known endemic *Cicindela* sites and at most of the "suitable-appearing" sites shown on the map.

Roughly estimating from USGS maps, there appears to be on the order of 15,000–20,000 acres of grassland remaining in Santa Cruz County; however the specialized conditions described above obtain in only a small minority of this total, possibly not more than 200–300 acres. Nearly all of this is concentrated around the coastal "midcounty" area, the most heavily urbanized portion of the county. Much of Santa Cruz, Live Oak, and part of Capitola were built on these clay-based marine terrace grasslands.

Occurrence #1. Terrace above Winkle Ave., Soquel

Strip of habitat ca. 200 m. long. Entire site threatened by proposed residential development ("Santa Cruz Gardens Unit 12"), although currently under temporary conservation easement placed on the site by the County (to protect rare plant habitat) when it approved Units 10 and 11. Unit 9, which was built out in 1987, contained habitat essentially identical to that of Unit 12, presumably as did some of the earlier units which share the same topography and soil.

Occurrence #2. Terraces west of Meder St., Santa Cruz

Habitat along ca. 1 km. stretch, mostly within the Younger Ranch just outside the Santa Cruz City limit. Currently under a benign regimen of grazing which has kept the habitat in good condition; future plans not known. Part of population extends into University property (UCSC has

development plans for this area, but I was recently told this may not materialize after all, at least not soon). Another extension of the population (and a large area of potential habitat not yet checked for the beetle) is on an adjacent property within the city limit, recently bought by a Fresno-based company. Temporary Greenbelt protection of this property expires this year, and biotic studies are now underway on a development proposal called "University Estates."

Occurrence #3. UCSC upper campus, east of Empire Grade

Patch of habitat ca. 200 m. across. Early campus expansion plans for this site have been abandoned. At present the only significant hazard here is the stream of recreational mountain-bikers who use the trail frequented by the beetles. During cool spells or while mating, the beetles are slow to react, and vulnerable. On my first visit I noticed two crushed individuals, and saw another having to dodge two cyclists in rapid succession. A crushed pair, presumably victims of mountain bikes, was also found at Occurrence #2.

Suitable-appearing habitat areas yet to be checked:

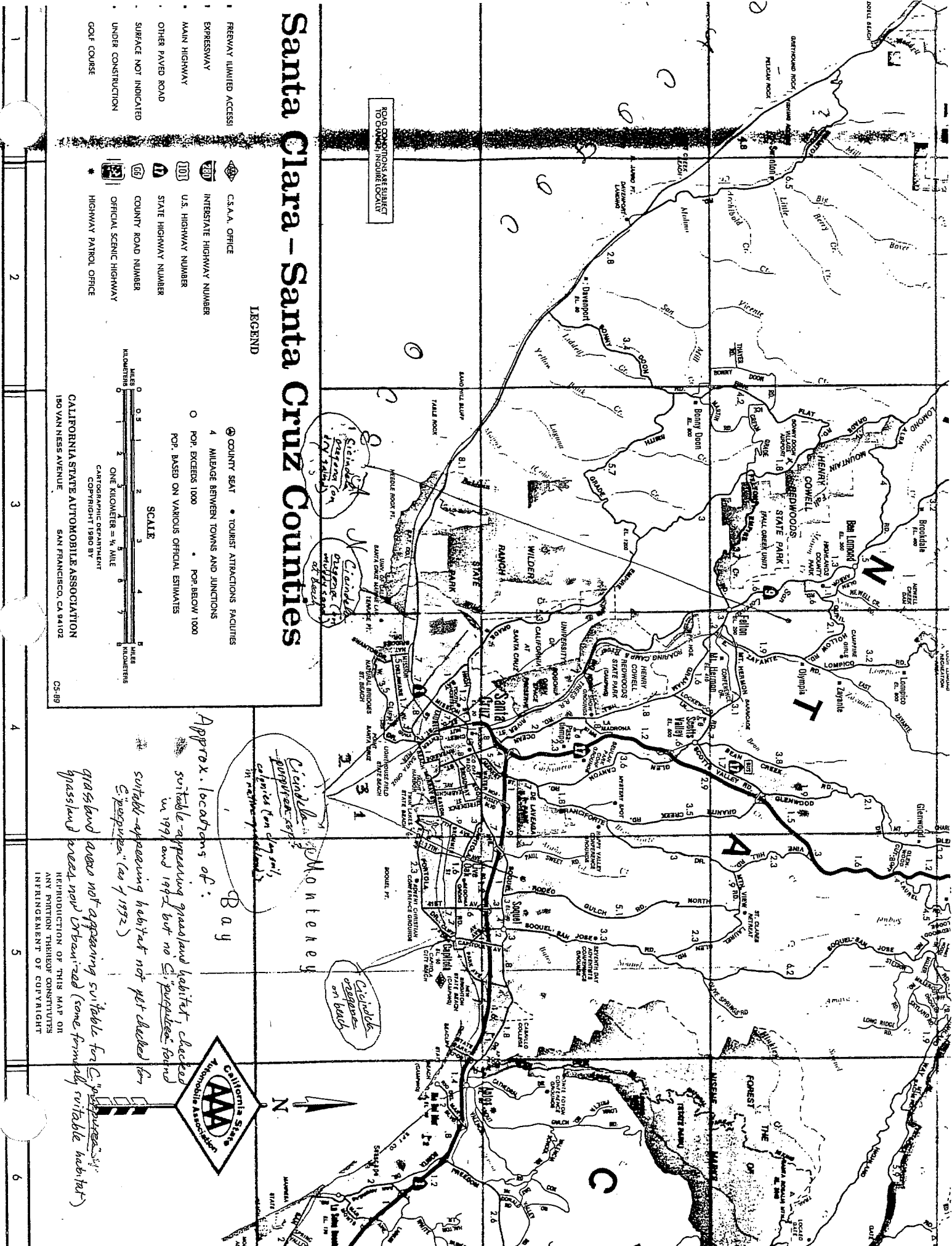
- "University Estates" site (discussed above)
- Grey Whale Ranch. West of Occurrence #3. A few patches of grassland here look quite promising, but access is restricted. A biological assessment by LSA has recently been issued for a subdivision here to be called "La Cumbre." Public hearings have not yet been held on this.
- Graham Hill Road. Good-looking but small patch of habitat. Being invaded by French Broom (*Cytisus monspessulanus*). One previous development proposal here fell through, and I believe there is another in the works but I have no details.
- Tan property, Soquel. Fairly large patch of habitat, but being invaded by French Broom and Eucalyptus. Proposed residential development (I believe called "Tan Heights") has not yet begun the formal environmental review process, although preliminary studies have been done on the rare plants there.

I hope this will answer most of your questions. Let me know if you need more. Thanks for your interest.

Sincerely,



R. Morgan
408-475-2212



Santa Clara - Santa Cruz Counties

LEGEND

- FREEWAY LIMITED ACCESS
- EXPRESSWAY
- MAIN HIGHWAY
- OTHER PAVED ROAD
- SURFACE NOT INDICATED
- UNDER CONSTRUCTION
- GOLF COURSE

- C.S.A.A. OFFICE
- INTERSTATE HIGHWAY NUMBER
- U.S. HIGHWAY NUMBER
- STATE HIGHWAY NUMBER
- COUNTY ROAD NUMBER
- OFFICIAL SCENIC HIGHWAY
- HIGHWAY PATROL OFFICE

- COUNTY SEAT
- TOURIST ATTRACTIONS FACILITIES
- MILEAGE BETWEEN TOWNS AND JUNCTIONS
- POP. EXCEEDS 1000
- POP. BELOW 1000

POP. BASED ON VARIOUS OFFICIAL ESTIMATES

SCALE
 0 0.5 1 2 3 4 5
 MILES
 0 0.5 1 2 3 4 5
 KILOMETERS

CALIFORNIA STATE AUTOMOBILE ASSOCIATION
 180 VAN NESS AVENUE
 SAN FRANCISCO, CA 94102
 CS-89

Apprx. locations of:

Ciencilla - purpurea scop. - appears (on clay soil) in riparian habitats

Ciencilla - purpurea scop. - appears on bank

Ciencilla - purpurea scop. - appears on bank

Bay

Monterey

grassland area not appearing suitable for "Ciencilla purpurea scop." suitable - appearing grassland habitat, checked in 1991 and 1992 but no Ciencilla purpurea scop. suitable - appearing habitat not yet checked for "Ciencilla purpurea scop." grassland area not appearing suitable for "Ciencilla purpurea scop." (some formerly suitable habitat)



ROAD CONDITIONS ARE SUBJECT TO CHANGE. INQUIRE LOCALY

1 2 3 4 5 6



Department of Entomology

30 June 1992

Mr. Christopher D. Nagano
Entomologist
U.S. Fish and Wildlife Service
Sacramento Field Office
2800 Cottage Way, Room E-1823
Sacramento, CA 95825

Dear Mr. Nagano:

I'm writing to let you know that, during his recent visit with me here at the California Academy of Sciences, Dr. Richard Freitag and I examined the tiger beetle specimens from a locality in Soquel that had been sent to me by Mr. Randall Morgan, a Soquel resident. We are convinced that these specimens represent at least a distinct subspecies, perhaps even a distinct species, which is undescribed. We have given this new form a high priority for description and publication and expect to submit the manuscript describing it by the end of 1992. We will designate the Soquel collection site as type locality for this new form.

It is our understanding that the site in which these specimens were found and collected is undergoing a planning review for possible development; and we are concerned for the future of this newly discovered form. It is likely restricted to the limited grassland habitat from which all known specimens have been taken. I believe that Mr. Morgan can provide you with more details on the distributional limits of both the beetle and its habitat.

I should mention that Dr. Freitag is a professional insect systematist with more than 25 years experience with tiger beetles on a worldwide basis, with special expertise on the species of western North America. I am curator of beetles (Coleoptera) at the California Academy of Sciences, have more than 20 years of experience with the systematics of carabid beetles, the group which includes tiger beetles, and have published more than 30 scientific papers on this group. We therefore feel confident in our recognition of this new form as something undescribed and distinct.

We will keep you advised of our progress on this project; and we hope that your office will be able to look into the nature and degree of threat to the population of this new tiger beetle in Soquel from impending development activities.

Yours sincerely,

David H. Kavanaugh
Curator of Coleoptera

A NEW SPECIES OF CICINDELA (CICINDELA)
(COLEOPTERA: CARABIDAE: CICINDELINI) FROM REMNANT NATIVE GRASSLAND
IN SANTA CRUZ COUNTY, CALIFORNIA

by

RICHARD FREITAG

Department of Biology, Lakehead University,
Thunder Bay, Ontario, Canada P7B 6B3

DAVID H. KAVANAUGH

Department of Entomology, California Academy of Sciences,
Golden Gate Park, San Francisco, California, U.S.A. 94118

and

RANDALL MORGAN

3500 N. Main Street
Soquel, California, U.S.A. 95073

Abstract

Cicindela new species (type locality: Soquel, Santa Cruz County, California) is described. Distinguishing characteristics of form and structure, geographical and habitat distribution, and life history features are discussed. This species is closely related to Cicindela purpurea Olivier in the purpurea species group of subgenus Cicindela. The apparently restricted geographical and habitat ranges of this species, coupled with pressure for urbanization of areas occupied by its known populations, raise immediate concerns for the long-term survival of this species and others that share its native grassland habitat.

One of us (RM) first collected adults of what we judge to be an undescribed species of Cicindela in February, 1990, near Soquel, California, while conducting an inventory of the vascular plants and insects of remnant areas of native grassland in Santa Cruz County. Adults were subsequently found at two other native grassland sites, in 1991 and 1992, respectively, west and northwest of the city of Santa Cruz. The oldest record we have found for this species is from a single specimen collected at the site northwest of Santa Cruz on March 29, 1987 by Mr. Isaac Field, who sent his specimen for study in early 1992.

Initial examination of the specimens from Santa Cruz County suggested that they might represent an unusual form of Cicindela purpurea Olivier (1790:14), most similar to C. purpurea lauta Casey (1897:296) and perhaps a variant of that subspecies. Subsequently, the new material was compared with specimens in the collection of the California Academy of Sciences representing several different subspecies of C. purpurea and with the primary types of Cicindela lauta Casey and Cicindela franciscana Casey (1913:23). This comparative study revealed differences in adult external form and structure, in addition to elytral maculation pattern, and in male and female genitalia between adults of the previously described taxa and the new material from Santa Cruz County. These differences were at least as great as those typically found between closely related, but distinct, species.

The purpose of this report is to provide a name for and description of this new species, to describe its apparent geographical and habitat distributions and unique phenology, and raise concerns for the long-term survival of this species and others that share its restricted and disappearing habitat.

Suggested common name: **Ohlone tiger beetle**

Description of Adults

Size.--Body length (= distance from the anterior margin of eyes to apex of left elytron) ca. 9.5-10.5 mm in males, 10.5-12.5 mm in females.

Form.--Elytra short in relation to length of forebody (head and prothorax) and broad, elytral silhouette subovoid.

Color.--Dorsum dull to sericate iridescent. Head and pronotum slightly glossy, bright green to blue, with tints of bronze on frons, back of head, and disc of pronotum, gena bright shiny green, or some individuals with slight blue or coppery reflections. Elytra bright green, sericate particularly along lateral margins, central portions with tint of brown overlay, markedly darkened around middle band, less so around other maculations; pale maculations reduced (Fig. 3), consisting of humeral and subhumeral spots, short and wide oblique middle band, and subapical and apical spots; sharp demarcation of bicolored pattern along lateral margin of elytra. Pleura coppery to coppery-green. Venter shiny green to blue green, lateral margins of abdomen slightly coppery in some individuals. Labrum pale in most individuals (black in a few). Maxillary and labial palpi black with coppery and green reflections. Legs coppery-green.

Vestiture.--Numerous long, erect setae present on clypeus, frons, and vertex of head, on lateral margins of pronotal disc (as longitudinal clusters), on basal one-third or less of elytra, on pleura (except absent from mesepisternum and very sparse on mesepimeron), on thoracic venter (except absent from prosternum and from medial two-thirds of metasternum), and on abdominal sterna 1-6 in males and 1-5 in females (only shorter setae present laterally on sternum 6 of females).

Thorax.--Pronotum short, heart-shaped, apical one-third broader in females than males (Figs. 2a,b). Coupling sulcus of female mesepisternum a deep linear groove. Elytra with apical medial spine absent. Legs with front and middle trochanters each with a sensory seta, femora moderately densely covered with long erect setae.

Mouthparts.--Labrum strongly tridentate, anterior margin more produced in females, six (in most specimens) to eight submarginal setae anteriorly (Figs. 1a,b). Tooth of mentum elongate.

Female genitalia.--Sternum 8 with broad, deep apical emargination; apices glabrous; single row of setae on lateral margins (Fig. 4a). Second gonocoxa with cluster of setae on apicomedial margin (Fig. 4a). Second gonapophysis with deep lateral notch in lateral valve (Fig. 4a). Syntergum 9 and 10 with lateral portions tapered apically (Fig. 4b). Ventral sclerite of bursa copulatrix broad, lightly sclerotized (Fig. 4c). Oviductal sclerite large, extending across basal two-thirds of bursa in ventral aspect (Fig. 4c), but very lightly sclerotized (almost membranous). Spermatheca and duct about 0.96 mm long.

Male genitalia.--Median lobe slightly arcuate in lateral aspect (Fig. 5a), apical portion, in ventral and dorsal aspects, appears as a skewed arrowhead (Figs. 5b,c), apical tip short and rounded (Figs. 5d,e). Internal sac with five well developed sclerites (Figs. 5d,e) [names of sclerites given here follow Rivalier (1954) and Freitag *et al.* (1985)]; flagellum short, slightly curved; arciform piece of average length and breadth, and mainly parallel to long axis of median lobe; tooth large; central plate large, rectangular; shield appears as apical extension of ventral root of tooth.

Geographical Distribution.--At present, known only from three localities in westcentral Santa Cruz County, California (Fig. 6), on coastal terraces at

or near the base of the southwestern slope of the Santa Cruz Mountains. One locality is west-northwest of Soquel (elev. 60-90 m); the other two are west (elev. 110 m) and northwest (elev. 340 m) of the city of Santa Cruz.

The fact that this species has remained undiscovered in central California until so recently and is apparently not represented in any of the several large entomological collections in the general area, either among unidentified materials or misidentified as some other species (DHK, personal observations), suggests that its geographical range is quite limited. In fact, we suggest that further sampling will show this species to be restricted to low and mid-elevation areas of suitable habitat southwest of the crest of the Santa Cruz Mountains in Santa Cruz County, possibly also in portions of San Mateo and Monterey counties.

Habitat distribution.--All three known populations inhabit remnant stands of open native grassland, with California oatgrass (Danthonia californica Bol.) and purple needlegrass (Stipa pulchra Hitchc.) on level or nearly level sites (Figs. 7-8). The substrate at all sites is a shallow (ca. 1 to 3 dm) layer of pale, poorly-drained clay or sandy clay soil over bedrock of Santa Cruz Mudstone. The soil layer bakes to a very hard crust in late spring and summer, after winter and early spring rains cease. Most adults of C. ohlone have been found where the grasses are low and sparse enough to leave significant areas of bare ground. Trails and trampled areas seem especially attractive to these beetles, although they often fly to areas of denser grass when disturbed.

Because the larvae of this species have not yet been found, their preferred microhabitat remains unknown. We suggest, however, that oviposition and larval development occur in these same grassland areas, perhaps in spots where the grasses are taller and denser, making location of the entrances to larval burrows more difficult.

Phenology.--The earliest seasonal record for adults is 29 January (1992), the latest record (RM, personal observation) is 5 April (1992). Records available suggest a marked peak of adult abundance in late February, at least during the period of observation and sampling, 1990 through 1992. This activity pattern is in marked contrast with that of related species. Adults of other species in the purpurea species group are active mainly in summer months, although the extremes in collection records range from March (earliest) to October (latest) (but neither of these extremes in California).

Type material.--Holotype, a male, deposited in the California Academy of Sciences, labelled as follows: "U.S.A. CALIF: Santa Cruz Co. Soquel, grassy terrace, Winkle Ave. 29 MAR 1991 coll: Randall Morgan"/ "T11S, R1W, N edge Sec. 9. Soquel Quad. 200-300' el. Native grassland remnant. Site of proposed devel"/ "911724". Paratypes: a total of 72 specimens from three localities, including (a) 38 specimens with same locality labels as holotype and dates and sexes as follows: 1990--Feb. 23 (3 males), Mar. 17 (1 female, 1 male); 1991--Feb. 3 (1, female, 3 males), Feb. 19 (3 females, 4 males), Mar. 7 (1 female), Mar. 22 (1 female, 1 male), Mar. 29 (1 female); 1992--Jan. 29 (1 male), Feb. 3 (1 male), Feb. 20 (3 females, 4 males), Feb. 26 (1 female), Mar. 9 (4 females, 4 males). (b) 15 specimens from the grasslands west of Meder Street, 110 m, Santa Cruz, with dates and sexes as follows: 1991--Feb. 25 (1 male); 1992--Feb. 24 (5 females, 7 males), Mar. 20 (1 female, 1 male). (c) 19 specimens from the grassland at Empire Grade, 340 m, Santa Cruz County, with dates and sexes as follows: 1987--Mar. 17 (1 female); 1992--Mar. 10 (4 females, 9 males), Mar. 23 (2 males), Apr. 1 (1 female, 2 males). Paratypes have been deposited in the California Academy of Sciences and the U. S. National Museum of Natural History, Washington.

Derivation of species epithet.--This species is named for the native

American people indigenous to the area where the species occurs.

Phylogenetic Relationships.--Cicindela is a member of the nearctic purpurea species group, which also includes C. cimarrona Leconte, C. plutonica Casey, C. pugetana Casey, and C. purpurea Olivier. This group is included in subgenus Cicindela sensu stricto. Our placement is based on synapotypic features of body pubescence, elytral color pattern, shape of the labrum, and the arrowhead-like apex of the male median lobe. Among the purpurea group taxa, adults of C. most closely resemble green members of C. purpurea, particularly members of subspecies C. purpurea lauta Casey, that inhabit the Pacific Northwest. These two species may be sister taxa, but we have not yet applied cladistic analysis to explore relationships within the purpurea species group.

Distinguishing features.--Adults of C. can be distinguished from green adults of C. purpurea and of other purpurea group taxa, to which they are most similar, by the following combination of traits: relatively small adult body size (larger size, with proportionately longer and less ovoid elytra in other taxa); bright, sericate, light green dorsum (darker green or blue green in other taxa) with tints of bronze on the pronotal disc and elytra, particularly around the middle band (brown highlight absent or indistinct in other taxa); broad elytral maculations (narrower in other taxa); presence of humeral and subhumeral spots (absent from other taxa); a deep notch in the lateral portion of the female gonapophysis (shallow or only faintly suggested in other taxa); a large, almost membranous oviductal sclerite (smaller in other taxa); and sharply defined lateroapical flanges on the male median lobe (less sharply defined in or absent from other taxa). Also, the winter-spring activity period of adults of this species is much earlier than that recorded for other purpurea group taxa. Cicindela occupies the southernmost geographical range of any purpurea group taxon

inhabiting the Pacific coast region, and its geographical distribution is apparently allopatric in relation to the range of the rest of the purpurea group.

Concerns for the Future

From a rough estimate based on U. S. Geological Survey maps, there appear to be about 15,000 to 20,000 acres of grassland remaining in Santa Cruz County, including both relatively pristine and disturbed grassland areas. However, the specialized substrate, slope, and exposure conditions described above for the habitat of C. obtain in only a small part of this total acreage, perhaps not more than 200 to 300 acres. Nearly all of this habitat is concentrated around the coastal "midcounty" area, the most heavily urbanized portion of the county. Much of Santa Cruz, Live Oak, and Capitola were built on these clay-based marine terrace grasslands. This is understandable, because the terrace areas provided naturally open, level sites with ocean views, ideal for development. Most comparable sites in the Monterey Bay area have already been urbanized, and remaining areas in the entire region with potential suitable habitat are few, small, and also threatened with future development.

It is likely that the range of C. was both more extensive and more continuous before the terrace grasslands were extensively altered or destroyed than at present. Because of the restricted geographical and habitat distribution of C. ohlone, its vulnerability to extinction or at least further severe population reduction is great. There must be concern also for the future of other plants and animals that are more or less restricted to this particular grassland habitat. Additional new species also may await discovery. Two species of Perideridia ("yampah"), P. gairdneri (H. & A.) Math. and P. kelloggii (Gray) Math., are uncommon in the region generally, but

one or both species occur at each of the known sites for C. , as well as at several other apparently suitable grassland sites in the county. These may serve as useful indicator species for this habitat, as well as for the possible occurrence of C. in some of these other areas. Clearly additional study and conservation of these few remaining native grassland areas is warranted.

Acknowledgements

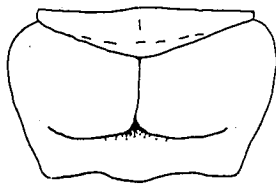
We thank Dr. Terry L. Erwin, U. S. National Museum of Natural History, Smithsonian Institution, Washington, D.C., for the loan of type specimens in his care from the T. L. Casey collection and Mr. Issac Field and Mr. Bryan Mori for providing their specimens for study. Technical assistance was provided by B. L. Barnes, Roberta L. Brett, and Pat Smith. The study was supported in part by grants from the Natural Sciences and Engineering Council of Canada (Grant No. A4888 to R. Freitag) and the National Science Foundation (Grant No. BSR-9024215 to D. H. Kavanaugh).

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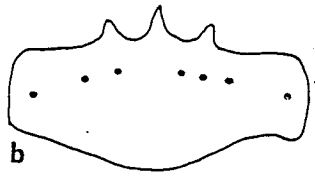
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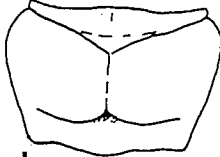
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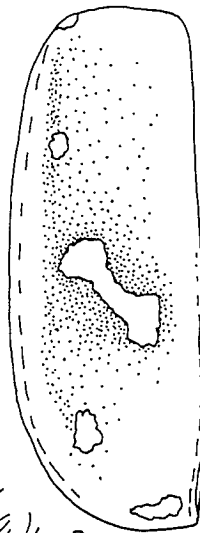
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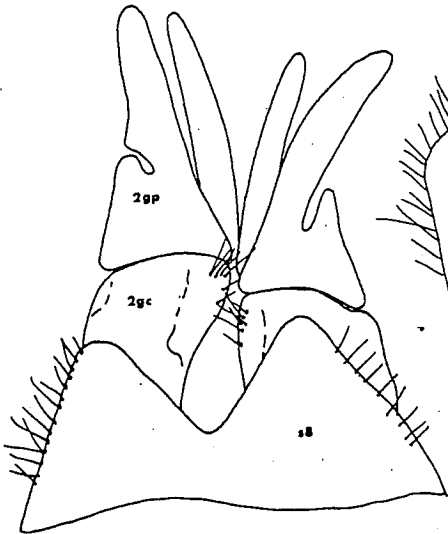
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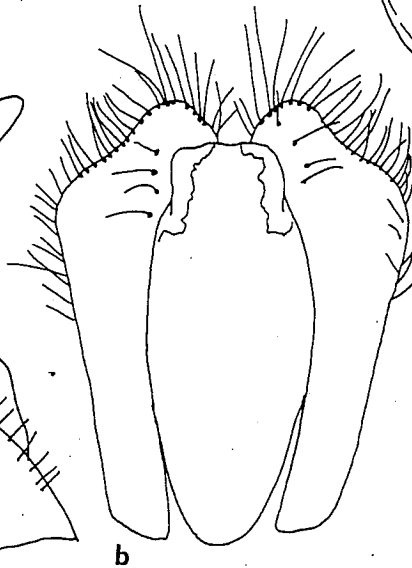
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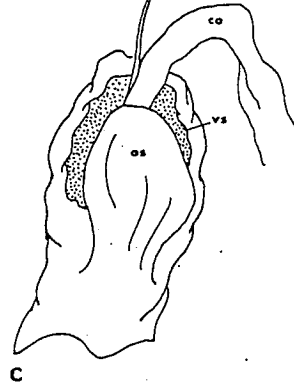
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4a



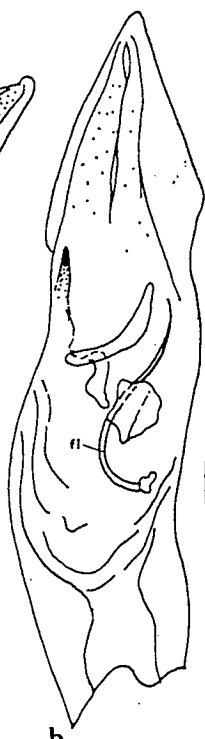
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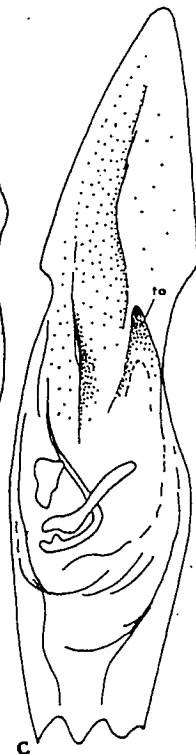
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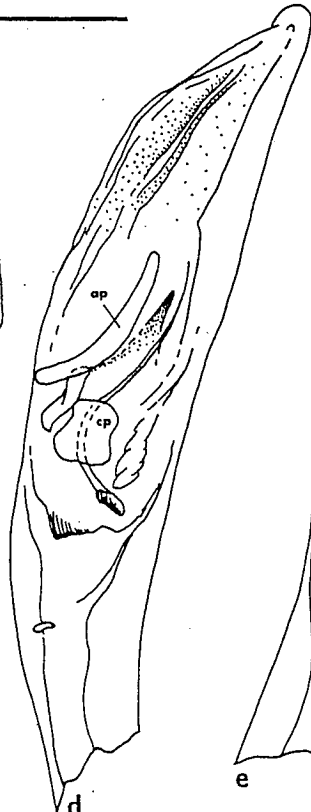
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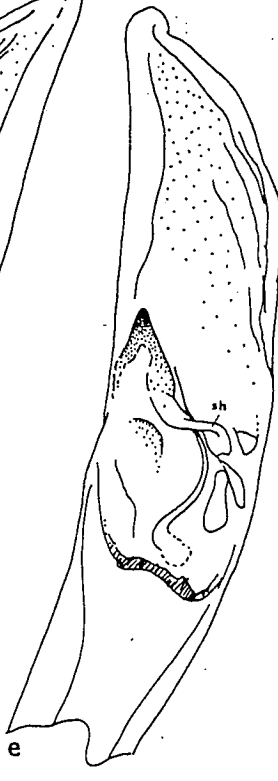
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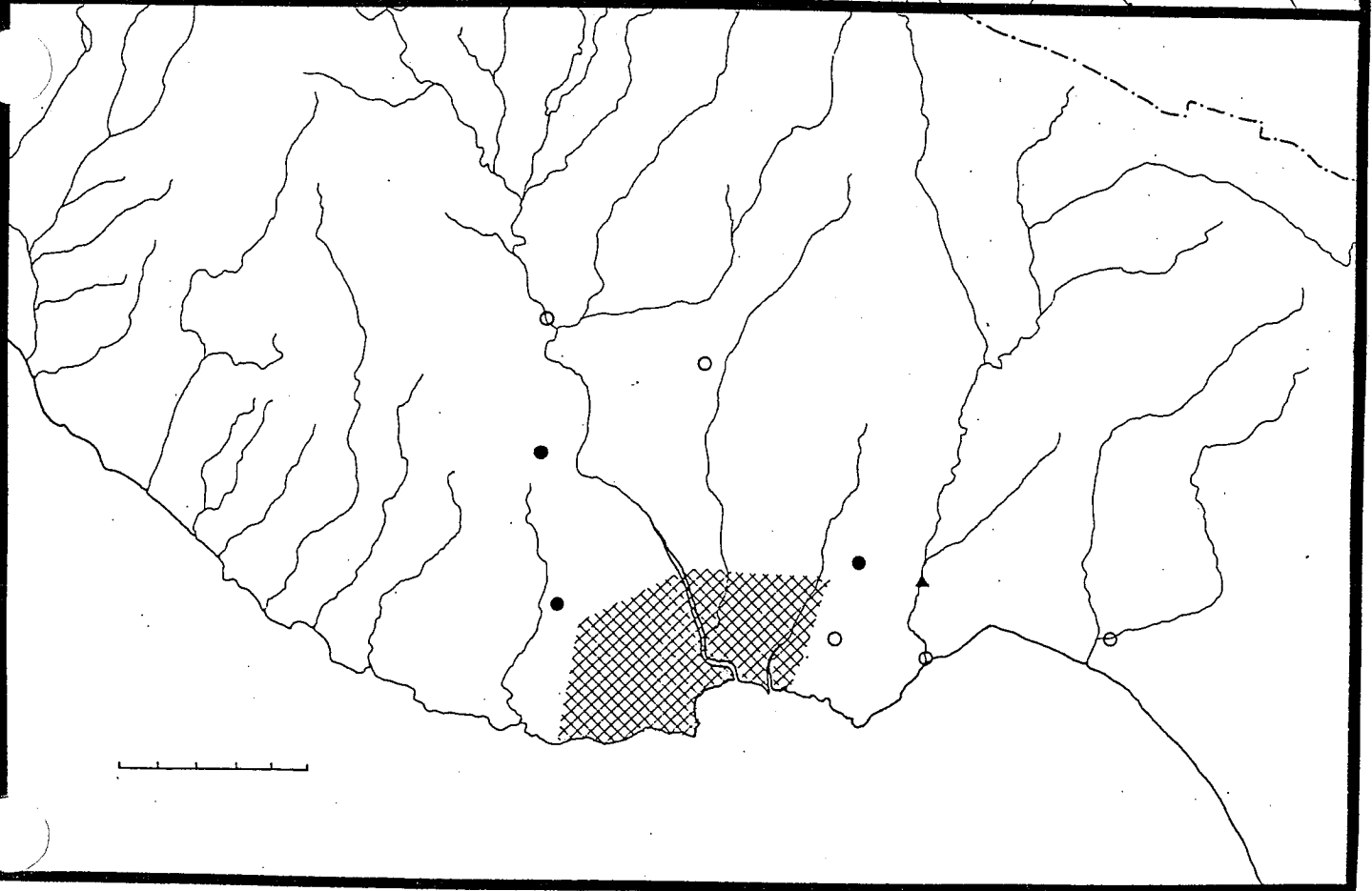
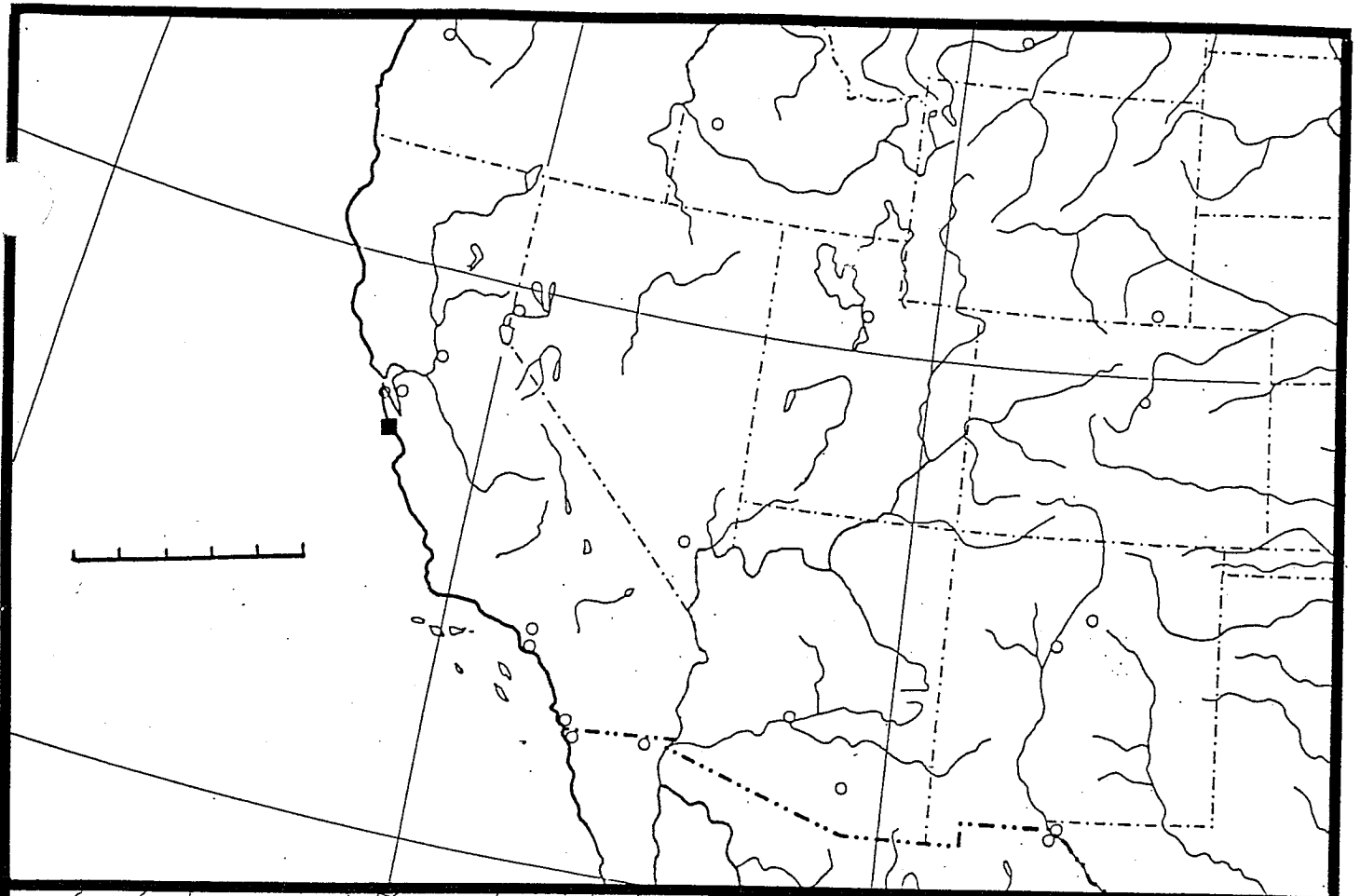


Figure Captions

Figs. 1-5. Structures of Cicindela n. sp. 1. Labrum: a. female; b. male. 2. Pronotum: a. female; b. male. 3. Left elytron of male. 4. Female genitalia: a. sternum 8 (s8), second gonacoxae (2gc), second gonapophyses (2gp); b. syntergum 9 and 10; c. bursa copulatrix ventral aspect, ventral sclerite of bursa (vs), oviductal sclerite (os), common oviduct (co), spermatheca (sp) and duct. 5. Male genitalia: a. median lobe and paramere, left lateral aspect; b-e. apex of median lobe: b. ventral aspect, c. dorsal aspect, d. left lateral aspect, e. right lateral aspect; internal sac and its sclerites, flagellum (fl), arciform piece (ap), tooth (to), central plate (cp), shield (sh). Scale lines = 1.0 mm.

Fig. 6. Maps illustrating known geographical distribution of Cicindela n. sp. Top, map of central western North America; black square = location of area ^{en} enlarged below; open circles = major cities; scale units = 100 km. Bottom, Santa Cruz area enlarged; solid circles = known localities; shaded area = city of Santa Cruz; solid triangle = Soquel; open circles = other small towns in the area; scale units = 1 km.

Figs. 7-8. Photographs of habitat for Cicindela 7. (top) Type locality, above Winkle Avenue, Soquel, California; view northward toward Santa Cruz Mountains; photograph taken in June, 1987. 8. (bottom) Large grassland west of Meder Street, Santa Cruz, California; view northward toward University of California campus; photograph taken in March, 1989.

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