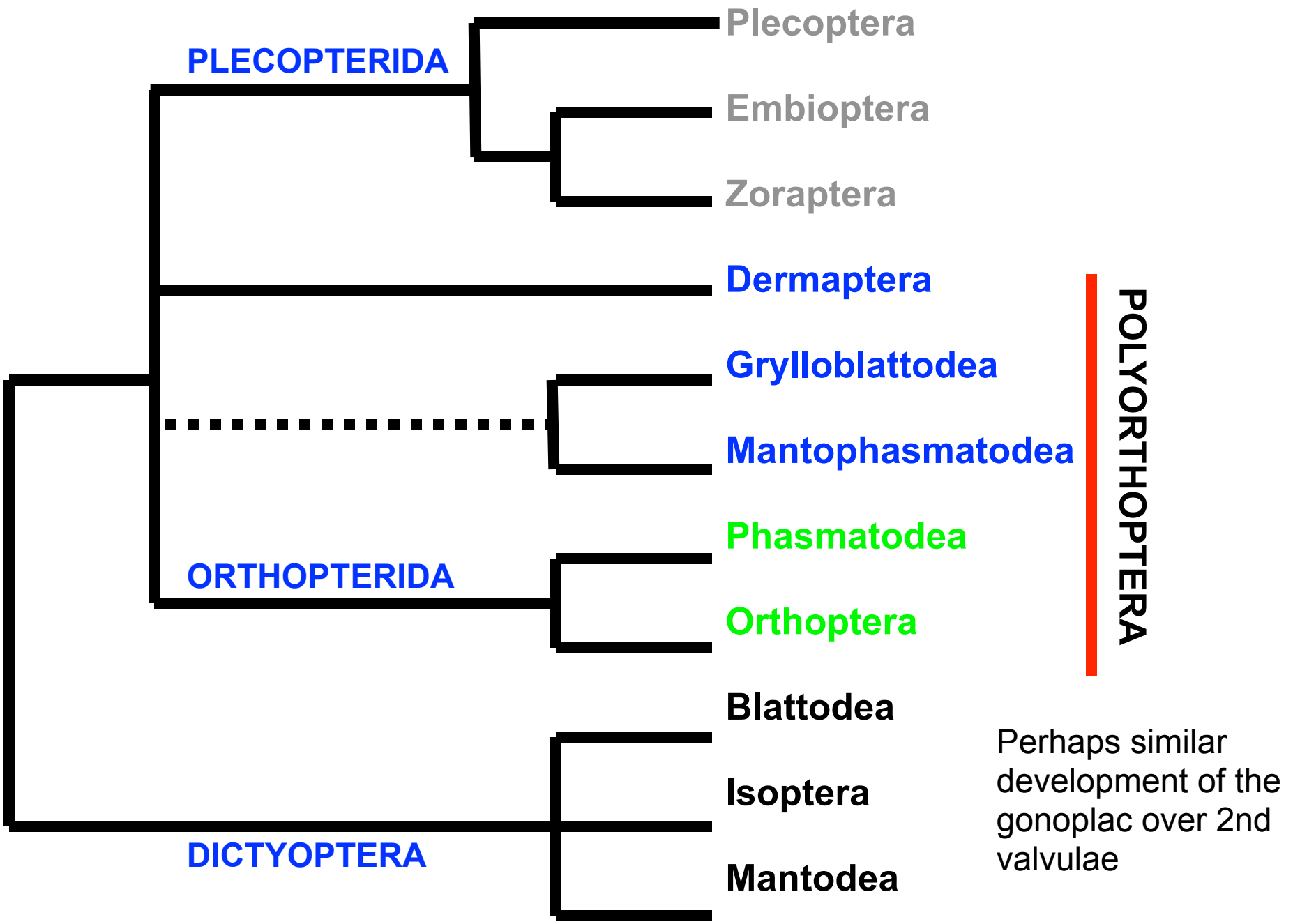
The remaining “Polyorthoptera”

Dermaptera

Grylloblattodea

Mantophasmatodea



Perhaps similar development of the gonoplac over 2nd valvulae

DERMAPTERA, Earwigs

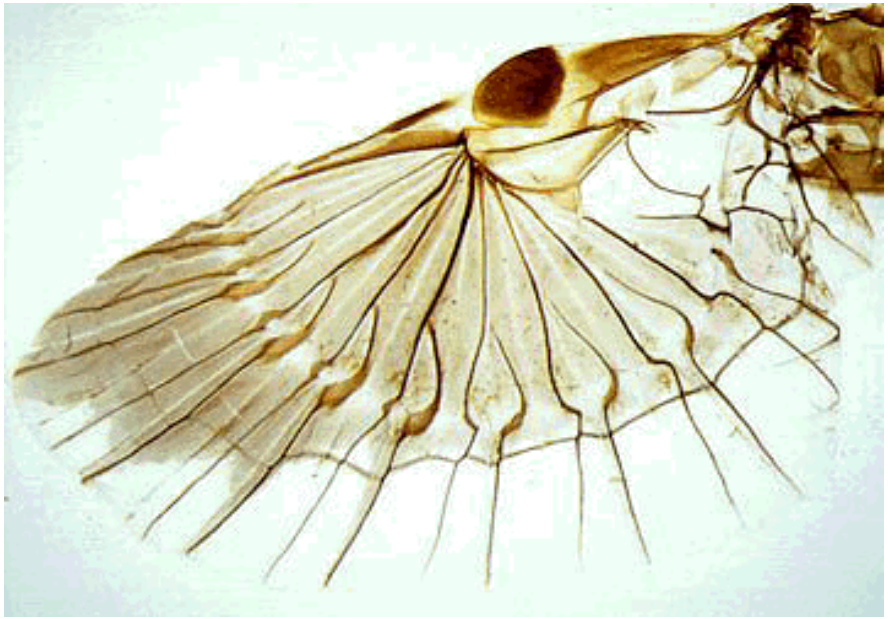
DERMAPTERA, Earwigs

SYNAPOMORPHIES

- Head prognathus, but lacking a gula
- Ocelli absent
- 3-segmented tarsi
- Male without "gonostyli" on segment 9
- Female with subgenital plate formed by enlarged sternum 7
- Ovipositor vestigial (when retained), with only 2 valve pairs.

DERMAPTERA, Earwigs

SYNAPOMORPHIES



- Forewings (when retained) short tegmina, with venation at most faintly indicated
- Hind wings (when retained) with remigium very reduced, melanized; expanded vannus complexly folded under forewings at rest.
- Cerci of adults forcepslike, without discernable segmentation

DERMAPTERA, Earwigs

Habitat & Habits:

- Found in leaf litter, under bark, riparian areas
- Mostly omnivorous, some tropical species ectoparasitic on certain rats, others occur in bat roosts; some are predaceous; few herbivorous.
- Nocturnal
- Forceps used to capture prey, in mating, and in folding hind wings under forewings
- Some females guard eggs and young in small nests, repel intruders; lick eggs perhaps to prevent fungal growth. After a few molts, nymphs are on their own.
- *Forficula auricularia* may be a pest of gardens and crops.
- Several species invade homes and may be nuisances.
- *Labidura riparia* is a predator of lepidopterous pests of agricultural crops.

DERMAPTERA, Earwigs

Diversity & Distribution:

- 1,900 species worldwide, mostly tropical/warm temperate
- 23 species in 6 families in U.S. and Canada, including 5 introduced species

Collecting and Preserving:

- Collect from leaf litter, peel back bark, overturn stones and logs; some fly to lights
- Pin or place in alcohol

GRYLLOBLATTODEA (=Grylloblattaria, Notoptera)

Rock crawlers, ice bugs, ice crawlers

GRYLLOBLATTODEA (=Grylloblattaria, Notoptera)
Rock crawlers, ice bugs, ice crawlers

SYNAPOMORPHIES

- Head prognathus, with compound eyes reduced or absent (ommatidea not contiguous)
- Ocelli absent
- Wings absent
- Metathoracic spina present (not found in any Recent Insecta)
- Abdominal venter 1 with median eversible sac
- Male gonopods and phallomeres asymmetrical

GRYLLOBLATTODEA (=Grylloblattaria, Notoptera)
Rock crawlers, ice bugs, ice crawlers

Other characteristics:

- Antennae long and slender
- Wingless
- Legs unmodified
- Long cerci
- Female ovipositor nearly as long as cerci
- Eyes small or absent
- Generally cylindrical, elongate

GRYLLOBLATTODEA (=Grylloblattaria, Notoptera)
Rock crawlers, ice bugs, ice crawlers

Habitat & Habits:

- Leaf litter or under stones in cold temperate forests or high elevations, often associated with montane ice fields, 1000-3000 meters; some Asian species in caves.
- Active from -8°C to 25°C, but optimal ca. 1-4°C. Can freeze to death at very low temps.
- Feed on carcasses of insects that have died on snow fields at high elevations, but also take plant material.
- Nocturnal, hide during day in crevices in cold, wet gravel or under snow.

GRYLLOBLATTODEA (=Grylloblattaria, Notoptera)
Rock crawlers, ice bugs, ice crawlers

Diversity & Distribution:

Only 26 species in the world in 5 genera and 1 family, Grylloblattidae

- *Grylloblattina* - Russian Far East
- *Grylloblattela* - Russian Far East
- *Grylloblatta* - NW US and Russian Far East
- *Galloisiana* - Japan, Korea, China, Russia
- *Namkungia* - Korea

Only 13 species in U.S. and Canada (all in *Grylloblatta*)

Collecting & Preserving:

- Collect at night with headlamps; turn over stones, logs, etc. during day
- Preserve in 80% ethanol

MANTOPHASMATODEA

Gladiators, African Rock Crawlers, Heelwalkers

MANTOPHASMATODEA

Gladiators, African Rock Crawlers, Heelwalkers

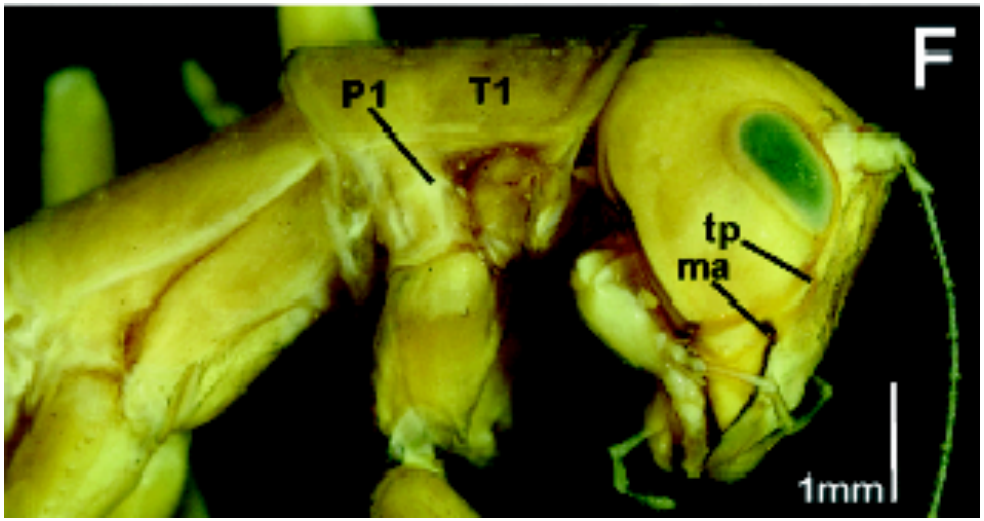
SYNAPOMORPHIES

- Head hypognathous
- Ocelli absent
- Wings absent
- Enlarged pretarsal arolium, with series of long setae
- 10th sternum with vomerlike process in males
- Unsegmented cerci (modified as claspers in males)

MANTOPHASMATODEA
Gladiators, African Rock Crawlers, Heelwalkers

SYNAPOMORPHIES

- Loss of epistomal sulcus
- Unique subgenal sulcus, with unusual looping



MANTOPHASMATODEA

Other characteristics:

- 2-3 cm, body cylindrical
- Antennae long, filiform
- Mouthparts mandibulate, hypognathous
- Large, convex eyes
- Tarsi 5-segmented, with large arolium
- Secondarily wingless
- Cerci short, one-segmented

MANTOPHASMATODEA

Taxonomic history:

- *Raptophasma kerneggeri* (Zompro 2001), from Baltic amber, “Orthoptera *incertae sedis*”
- Two undetermined museum specimens collected from Namibia in 1909 and Tanzania in1950
- South African Museum: series collected in 1890. L.A. Perinquey determines as new genus/species *Ograbiesa ferox* (prob. Mantodea) but never published. Remains lost in mantid drawer until 2002, until the publication of Klass et al.!

MANTOPHASMATODEA

The original publication!

Klass, K.-D., O. Zompro, N.P. Kristensen, & J. Adis. 2002. Mantophasmatodea: a new insect order with extant members in the Afrotropics. Science 296: 1456-1459

Specimens have since been turning up in collections and in nature ever since!

MANTOPHASMATODEA

Insect Taxonomy student (Spring Semester 2006) **Laura Petersen**, collects Mantophasmatodea during family vacation in Namibia and donates to University of Minnesota Insect Collection!!!!

MANTOPHASMATODEA

Habitat & Habits:

- Carnivorous, feed on small insects
- Hide during day, hunt at night
- Grasp & hold prey with spiky, enlarged forelegs
- Frequent grooming, especially of arolium
- Arolium held up in air when walking

MANTOPHASMATODEA

Habitat & Habits:

- Eggs hatch at beginning of rainy season
- Juveniles develop during the wet winter months and reach adulthood in spring
- Adults mate, lay eggs and die within a couple of weeks
- Egg pod made of sand granules cemented together with water resistant glue
- Color variation within populations

MANTOPHASMATODEA

Habitat & Habits:

- Males are smaller and more slender than females
- Courtship involves “tapping” of abdomens against substrate
- Females tap lower frequency than males
- Male uses cerci to clasp female, & extends his abdomen down the side of the female in an “s” shape
- Mating lasts 1-3 days
- Males frequently eaten after mating

MANTOPHASMATODEA

Diversity & Distribution:

- Southern Africa
- Restricted, relict group
- Dry, xeric areas, hiding in rock crevices and grass tufts

- 15 extant species
- 10 genera
- 3 families
- 3 species in “Family Inquirendo”

Collecting and Preserving:

- Use techniques similar to stick insects and preying mantids - search habitat by hand, beat & sweep vegetation, search through grass clumps
- Pin