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## Collaboration Network

**Botanists who have provided scientific determinations for Jonathan D. Amith (most have signed letters of commitment on Amith's active NSF grant)**

### Botany: Institutions

ARIZ	University of Arizona	ASTC	Stephen F. Austin State University
ASU	Arizona State University	AUB	Andrews University
BM	The Natural History Museum, London	CAS	California Academy of Sciences
CICY	Herbario CICY, Centro de Investigación Científica de Yucatán	CM	Carnegie Museum of Natural History
COL	Universidad Nacional de Colombia	Cornell	Cornell University
FCME	Facultad de Ciencias, UNAM	Field	Field Museum, Chicago
GENT	Ghent University	HRCB	Universidade Estadual Paulista, São Paulo
HUA	Universidad de Antioquia, Medellín	HUEFS	Universidade Estadual de Feira de Santana, Brazil
IA	University of Iowa	IE-BAJIO	Herbario del Instituto de Ecología, Pátzcuaro, Michoacán, Mexico
INECOL	Instituto de Ecología, El Bajío	ILLS	Illinois Natural History Survey
K	Royal Botanic Gardens, Kew, England	MA	Real Jardín Botánico, Madrid, Spain
MEXU	Herbario Nacional, Universidad Nacional Autónoma de México	MICH	University of Michigan
MO	Missouri Botanical Garden	NASU	Northern Arizona State University
NCBN	Netherlands Centre for Biodiversity Naturalis	NMSU	New Mexico State University
NTBG	National Tropical Botanical Garden, Hawai'i	NY	New York Botanical Garden
ODU	Old Dominion University	OXF	University of Oxford
PUE	Universidad Autónoma de Puebla, Herbario	RBCE	Royal Botanic Garden, Edinburgh
SMSU	Southeast Missouri State University	SPF	Universidade de São Paulo, Brazil
TEX	University of Texas	UAMI	Universidad Autónoma Metropolitana, Itzamal
UBC	University of British Columbia	UC	University of California, Berkeley
UCCE	University of California Cooperative Extension	UCR	University of California, Riverside
UEP	Universidade Estadual Paulista, Brazil	UNAM	Universidad Nacional Autónoma de México
UNAM-CIE	UNAM, Centro de Investigación en Ecosistemas	US	National Herbarium, Smithsonian Institution
USF	University of South Florida	USMS	University of Southern Mississippi
UVIC	University of Victoria, British Columbia, Canada	UWM	University of Wisconsin, Milwaukee
VPI	Virginia Polytechnic Institute	WIS	University of Wisconsin

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**Arecaceae:** Andrew Henderson (NY), Donald Hodel (UCCE; Genus *Chamaedorea*); **Aristolochiaceae:** Larry Kelly (NY); **Asclepiadaceae:** Douglas Stevens (MO), Lucio Lozada (FCME); **Asteraceae:** Harold Robinson (US), José Luis Villaseñor (MEXU), Jorge Rojas (FCME); **Begoniaceae:** Kathleen Burt-Utley (USF), Mark Hughes (RBCE); **Bignoniaceae:** Lúcia Lohmann (SPF), Esteban Martínez (MEXU); **Bombacaceae:** Larry Dorr (US); **Boraginaceae:** Jim Miller (MO), María Goreti Campos-Rios (CICY), Christian Feuillet (US); **Burseraceae:** Jerzy Rzedowski (IE-BAJIO), Rosa Linda Medina (FCME), Douglas Daly (NY); **Cactaceae:** Salvador Arias (MEXU); **Campanulaceae:** Tina Ayers (NASU); **Caryophyllaceae:** Hilda Flores (MEXU), Rosa María Fonseca (FCME), Richard Rabeler (MICH); **Cannaceae:** John Kress (US), Paul Maas (NCBN); **Caricaceae:** Mark Olson (MEXU); **Celastraceae:** Lucio Lozada (FCME), Júlio Lombardi (HRCB); **Chenopodiaceae:** Hilda Flores (MEXU), Donald Pratt (ASTC); **Chrysobalanaceae:** Ghillian Prance (K); **Commelinaceae:** Robert Faden (US), Alfonso Espejo Serna (UAMI); **Convolvulaceae:** Manuel Castro (FCME), Dan Austin (ARIZ), Andrew MacDonald (TEX); **Costaceae:** Paul Maas (NCBN); **Cucurbitaceae:** Michel Nee (NY); **Cuscutaceae:** Lytton J. Musselman (ODU); **Cyperaceae:** Mark Strong (US); **Dioscoreaceae:** Lauren Raz (COL), Oswaldo Téllez-Valdes (UNAM); **Ebenaceae:** Mitchell Provance (UCR); **Ericaceae:** Peter Fritsch (CAS); **Euphorbiaceae:** Paul Berry (MICH); Martha Martínez (FCME); Victor Steinman (INECOL); Geoff Levin (ILLS; Genus *Acalypha*), Javier Fernández Casas (MA; Genus *Cnidocolus*); **Fagaceae:** Allen Coombes (PUE), Susana Valencia (FCME); **Fern and fern allies (including Selaginellaceae):** John Mickel (NY), Robbin Moran (NY), José Daniel Tejero Díez (UNAM); **Flacourtiaceae:** Mac Alford (USMS); **Gesneriaceae:** Angélica Ramírez (MEXU), Larry Skog (US); **Heliconiaceae:** John Kress (US); **Hypericaceae:** N.K.B. Robson (BM); **Iridaceae:** Peter Goldblatt (MO), Alfonso Espejo Serna (UAMI); **Lamiaceae:** Ray Harley (K), Martha Martínez (FCME), Gemma L.C. Bramley (K), Lesley Walsingham (K); **Lauraceae:** Hendrik H. Van der Werff (MO); **Leguminosae:** Mario Sousa (MEXU), Rosaura Grether (MEXU; genus *Mimosa*), Ramiro Cruz (MEXU; subfamily Papilionoideae), Lourdes Rico (K; genera *Acacia* and *Acaciella*), Gwilym Lewis (K; all, particularly subfamily Caesalpinoidea), Colin Hughes (OXF; genus *Leucaena*), Terry Pennington (K; genus *Inga*); Toby Pennington (K; genus *Dussia*), Leticia Torres (MEXU, Genus *Desmodium*); **Liliaceae:** Abisai García (MEXU); **Loasaceae:** Nelly Diego (FCME), Rosa María Fonseca (FCME); **Loranthaceae:** Job Kuijt (UVIC); **Lythraceae:** Shirley Graham (MO); **Malpighiaceae:** Christiane Anderson (MICH); **Malvaceae:** Larry Dorr (US); **Marantaceae:** Helen Kennedy (UBC); **Melastomataceae:** Frank Almeda (CAS), Ricardo de Santiago (FCME); **Meliaceae:** Terry Pennington (K); **Menispermaceae:** Sara Hoot and Keir Wefferling (UWM); **Moraceae:** Guillermo Ibarra-Martínez (UNAM-CIE); **Myrsinaceae:** Jon Robertson (MO); **Myrtaceae:** Les Landrum (ASU), Eve Lucas (K), Fred Barrie (Field); **Nyctaginaceae:** Hilda Flores (MEXU), Richard Spellenberg (NMSU); **Onagraceae:** Warren Wagner (US), Peter Hoch (MO); **Orchidaceae:** Gerardo Salazar (MEXU); Cássio van den Berg (HUEFS); **Oxalidaceae:** Eve Emshwiller and Andrew Gardner (WIS); **Papaveraceae:** Robert Kiger (CM); **Passifloraceae:** John MacDougal (MO), Peter Jorgensen (MO); **Phytolaccaceae:** Jerrold Davis (Cornell), Hilda Flores (MEXU); **Pinaceae:** David Gernandt (MEXU); **Piperaceae:** Ricardo Callejas (HUA), Allan Bornstein (genus *Piper*, SMSU), Guido Mathieu (genus *Peperomia*, GENT); **Poaceae:** Paul Peterson (US); **Polygalaceae:** Tom Wendt (Tex); **Polygonaceae:** Hilda Flores (MEXU); **Portulacaceae:** Gilberto Ocampo (CAS); **Putranjivaceae:** Geoffrey Levin (ILLS); **Ranunculaceae:** Sara Hoot (UWM); **Rhamnaceae:** Rafael Fernández (), Amy Pool (MO), Tom Wendt (Tex); **Rosaceae:** Fred Barrie (Field); **Rubiaceae:** Charlotte Taylor (MO), David Lorence (NTBG), Helga Ochoterena (MEXU); **Rutaceae:** Fernando Chiang (MEXU); **Sapindaceae:** Pedro Acevedo (US); **Sapotaceae:** Terry Pennington (K); **Scophulariaceae:** Mark Strong (US); **Solanaceae:** Robert Bye (MEXU), Michael Nee (NY); **Sterculiaceae:** Larry Dorr (US); **Tiliaceae:** Larry Dorr (US); **Urticaceae:** Rosa María Fonseca (FCME), Victor Steinmann (INECOL), Dennis Woodland (AUB); **Valerianaceae:** Fred Barrie (Field); **Verbenaceae:** Sandy Atkins (K), Gemma L.C. Bramley (K); **Vitaceae:** Julio Lombardi (HRCB); **Zingerberaceae:** John Kress (US); **Zygophyllaceae:** Duncan Porter (VPI)

## **Insects: Taxonomic experts who have helped with identifications (partial list covering major families)**

### **Coleoptera (Beetles)**

*Buprestidae* (jewel beetles): Norman Woodley (Agricultural Research Service, Smithsonian)  
*Cerambycidae* (long-horned beetles): Steven Lingafelter (Agricultural Research Service, Smithsonian)  
*Chrysomelidae* (subfamily *Bruchinae*): Jesús Romero (Colegio de Posgrados, Mexico City), Geoffrey Morse (University of San Diego); *Chrysomelidae* (subfamily *Chrysomelinae*): Charles Staines (Smithsonian)  
*Meloidae* (blister beetles): John Pinto (University of California, Riverside, retired)  
*Scarabaeidae* (scarab beetles): Brett Ratcliffe (University of Nebraska, Lincoln)  
*Tenebrionidae* (darkling beetles): Warren Steiner (Agricultural Research Service, Smithsonian), Aaron Smith (Northern Arizona State University)

### **Hemiptera (true bugs)**

*Cercopidae* (Spittlebugs and Froghoppers), *Cicadellidae* (leafhoppers), *Membracidae* (Treehoppers): Stuart McKamey (Agricultural Research Service, Smithsonian)  
*Coreidae* (Leaf-footed bugs): Harry Brailovsky (UNAM), Tom Henry (Agricultural Research Service, Smithsonian), Carl Schaeffer (University of Connecticut)  
*Cicadidae* (cicadas): Allen Sanborn (Barry University)  
*Cydnidae* (burrowing bugs): Tom Henry (Agricultural Research Service, Smithsonian), David Rider (North Dakota State University)  
*Gerridae* (Water Striders), *Naucoridae* (Creeping Water Bugs), *Veliidae* (Smaller Water Striders): Robert Sites (University of Missouri)  
*Pentatomidae* (stink bugs): David Rider (NDSU)

### **Hymenoptera (sawflies, wasps, bees, ants)**

*Apidae* (bees), Charles Michener (University of Kansas), Terry Griswold (Agricultural Research Service), Ricardo Ayala (UNAM, Chamela), Sam Droege (Smithsonian), Victor González (University of Kansas); Sandra Rehan (genus *Ceratina*; University of New Hampshire), Robert Minkley (genus *Xylocopa*; University of Rochester), James Cane (genus *Peponapis*, *Halictus*; Agricultural Research Service), Ismael Hinojosa (*Englossini*, Emory University)  
*Formicidae* (ants): Ted Schultz (Smithsonian), William Mackay (University of Texas, El Paso); Phil Ward (University of California, Davis), John Longino (University of Utah), Andy Suárez, Rafaél Achury (University of Illinois, Urbana-Champaign)  
*Halictidae* (sweat bees): Victor González (University of Kansas)  
*Mutillidae* (Velvet Ants): Kevin Williams (Florida State Collection of Arthropods)  
*Pompilidae* (spider wasps): James Pitts (Utah State University)  
*Vespidae* (wasps): James Carpenter (American Museum of Natural History)

**Example field photos of botanical collections identified by taxonomic experts:  
To be used in website**

*Lobelia cardinalis* (Family Campanulaceae)



*Asclepias curassavica* (Family Asclepiadiaceae, now in Apocynaceae)





*Phytolacca rivinoides* (Family Phytolaccaceae)



*Cleoserrata speciosa* (Family Cleomaceae)





## Example synoptic webpage: Lexicosemantic Entry for Chapolin, Oapan Nahuatl

In some cases, a native term will correspond rather precisely to a scientific taxonomic category, whether it represents a family, tribe, genus, section, or species. For example, the Nahuatl term *mēmēya* labels the section *Chamaesyce* of the genus *Euphorbia* in the spurge (Euphorbiaceae) family. Because *mēmēya* basically translates as *Chamaesyce*, with no caveats or exceptions, the synoptic page on this term will note the coincidence of Indigenous and scientific classifications of the natural environment.

But most often Indigenous and scientific taxonomies do not coincide and thus a simple translation of the Indigenous term is impossible. Instead, the synoptic pages must be descriptive, analyzing and explaining the relationships between the Indigenous and scientific classifications. The following material, on the Nahuatl term *chapolin*, illustrates a preliminary approximation of the content of one of the more involved synoptic presentations. The online version will be visually richer and organized in various screens (underlined terms below are hyperlinks).

The Náhuatl word *chapolin*, often translated as ‘grasshopper’, is one of the best-known Nahuatl insect names. It is now a vernacular term (*chapulín*) in some Latin American countries and is listed as a headword in the dictionary of the Real Academia de la Lengua Española (Spain).

All Mexican children are familiar with a Mexico City neighborhood named Chapultepec—the site of a famous mid–nineteenth-century battle against the United States—and many would be able to correctly translate it as ‘grasshopper hill (*-tepec*)’. In Spanish, ‘chapolín’ usually refers to any of the six Mexican species in the genus *Sphenarium*, a genus that includes the most widely eaten and commercialized grasshoppers in Mexico, often sold in local markets as a delicacy. But in the Balsas River valley *chapolin* can acquire up to four meanings depending upon the context of utterance.

The first meaning of *chapolin* denotes *Sphenarium purpurascens purpurascens* (first illustration) the western subspecies of this species, found and consumed extensively throughout Mexico. In the Balsas

River valley it is also the most

abundant Orthoptera (an order of insects that includes grasshoppers, katydids, and crickets). In a typical day’s hunt it will comprise well over half the species collected. At times speakers will qualify the term by saying *kwahli chapolin* (literally ‘good’ or ‘real chapolín’) to distinguish it from other edible insects of the Orthoptera and related orders (Phasmatodea, ‘stick insects’, and Mantidae, ‘mantis’). The *Sphenarium purpurascens* is also known locally as *chapoltekwikwil*, in reference to its spotted or variegated coloring.

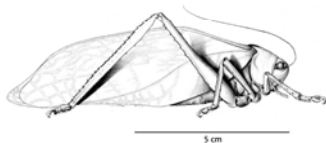
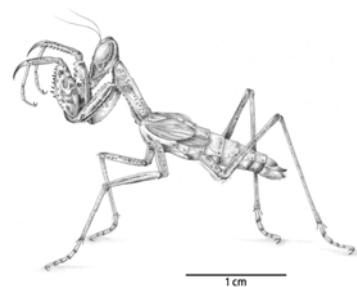
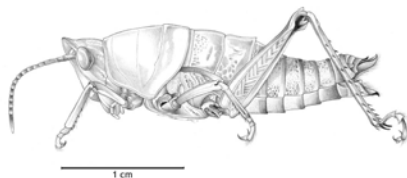
The second meaning of *chapolin* refers to an immediately superior category that includes both the *kwahli chapolin* and the *yēlōchapolin* (literally ‘young ear of corn [*yēlōtl*] chapolín). Speakers designated several collected Orthoptera as *yēlōchapolin*. These species were all nymphs, with a solid light-green body, caught in late summer when the maize plants were still young. Thus the *yēlō-* element prefixed to *chapolin* could refer to the color of these grasshoppers, the fact that they are associated with young maize plants, or the fact that they are nymphs (‘green’, ‘immature’).

In a third sense, *chapolin* includes all edible insects of the Orthoptera, Phasmatodea, and Mantidae orders. Speakers will commonly say, when referring to an edible stick insect or mantis, “*nō chapolin, nō nokwa*” (‘it is also a chapolín, it is also edible’). Of the stick insects, *tlakōmēmeka* (literally, ‘stick-twine’), only one species is edible, and in this species it is only the much larger female that is collected (although an unfortunate male might accidentally make it into the pot). Among the mantis it is also only the female that is eaten. With one, called *chachateya*, the eggs are consumed as well. There is strong linguistic evidence that *chapolin* in this third sense references all edible grasshoppers, katydids (also Orthoptera), stick insects, and mantis. A Nahuatl verb *cháchapolma* is used to mean ‘to hunt chapulines’ and many edible insects in the three above-mentioned orders are considered “catches”.

The fourth sense of *chapolin* is the most general and one whose defining criteria is morphological: it designates all grasshoppers and katydids, whether or not they are edible. Among the Orthoptera found in the region, the term used in this sense includes the short-horned grasshoppers (suborder Caelifera) and the katydids (family Tettigonidae in the suborder Ensifera) but excludes all types of crickets. Even though in scientific classification katydids are in the suborder Ensifera (along with crickets) and grasshoppers are in the suborder Caelifera, Nahuatl-speakers will join the katydids and grasshoppers in one category.

The naming conventions of specific *chapolin* are quite varied, and a few are mentioned here (see Orthoptera naming). Only two taxa actually contain the term *chapolin* as part of their name (*kwahli chapolin* and *yēlōchapolin*). Some names are onomatopoeic, imitating the sounds the insects make: *tēsīs*, *tepachichi*, *chowilili*. Others are descriptive: *kwēkwetlaxak* (literally, ‘sandal-like’, referring to the form and marking of the pronotum) and *tsontekomāma* (literally, ‘head carrier’, or ‘no-necked’, see third illustration). Color may motivate the name. Thus *tēpoyo* (‘greyish’, any species in the large group of band-winged grasshoppers) and *kōskayān* (‘marigold’) for the decoration on two species of *Netrosoma*. Finally, “function” might motivate the name as occurs with *kānika Mējikhoh*

(‘which way to Mexico City’), a term that covers all mantis, which children may playfully hold up to their faces to ask directions, the mantis responding by moving its front legs. The Spanish vernacular name ‘campamocha’ derives from a related Nahuatl term, *kāmpa mochān*, ‘which way to your house’.



**Preliminary Translation to Spanish of Sierra Nororiental de Puebla Nahuatl text on kwitanekmeh (*Partamona bilineata*) bees**

Online presentation will include English and Spanish translation, access to the digital recording (to be listed to while following along in the transcription)

For audio (full transcription [.docx], and time-coded transcription [.trs]) go to <http://www.balsas-nahuatl.org/NEH> > Kwitanekmeh.mp3 or Kwitanekmeh.wav

<p><b>ADA:</b> Āxkān nē nikān sepa, sepa timo..., kualtsīn timo..., timoahsih. Nē nikneki xinēchtapowi ox tikiñixmati yōn seki okuiltsitsi:n kinilwiah kuitanekmeh. Neh nō nikiñixmattok pero āmo nikmati ox yehwān nikiñixmati tein teh tikiñixmattok.</p>	<p><b>ADA:</b> <i>Ahora nos volvemos a encontrar en este lugar. Yo quiero que me platicues si acaso conoces unos animalitos conocidos como kuitanekmeh. Yo también los conozco pero no estoy seguro si sean los mismos que tú conoces.</i></p>
<p><b>RMM:</b> Ahā. Īn kēmah, <i>este</i>, n' āmo nikmati de katiyeh tinēchnohnōtsa, <i>este</i>, onkakeh .... Neh nikmati ōme taman. Ōme taman tikiñixmatih de n' kuitanekmeh. Pero āmo nikmati kēyeh kin..., kit..., tikihtowah ōme taman pero neh nikita pané: iwki sah n' okuiltsitsi:n. Pero tikmatis tehwān tikihtowah sē, <i>este</i> ōme taman <i>porque</i> onkakeh tein tel..., teltawēlmeh, tein te..., tein tēltehti..., tel..., teltekehkehtsomah ata wān onkak tein āmo, āmo semi tē..., tēkīts..., tē..., tēkuih. Āmo nikmati kox yehwa <i>mismo</i>, tehwātsīn xā tikmattos kox yehwa <i>mismo</i> n' okuiltsitsi:n. Neh nikita pané: yehwa <i>mismo</i> pero sayoh ki..., kipata nēn tikihtowah tehwān <i>porque</i>, <i>este</i>, ¿kēní:w nikihtōs neh?, lohlo..., lōkohtikeh seki neli, tel..., teltē..., teltēsenkuih. Wān onkak āmo semi.</p>	<p><b>RMM:</b> <i>Aha, si, este... no sé de cuáles me estás hablando. Yo sé que hay dos clases. Conocemos dos tipos de kuitanekmeh. Pero no sé por qué les ..., porque decimos que son dos clases porque yo veo que todos son iguales esos animalitos. Pero quizá tú pensarás que reconocemos uno, digo dos clases porque hay unos que son muy bravos, que muerden mucho y hay otros que no, no molestan a uno. No sé si sean los mismos, tú tal vez sabrás si son lo mismo. Yo veo que se parecen mucho y sólo decimos que son diferentes porque, ¿cómo te diré? algunos son bravos de verdad, se abalanzan sobre uno. Y otros no son tanto así.</i></p>
<p><b>ADA:</b> Teltētantekih tikihtōsneki. <b>RMM:</b> Mm, yehwa yōn.</p>	<p><b>ADA:</b> <i>Lo que quieres decir es que muerden mucho.</i> <b>RMM:</b> <i>Mm, eso es.</i></p>
<p><b>ADA:</b> Neh nō nikiñixmattok, moita nochi iwki sah n' okuiltsitsi:n wān āmo nikmati ox motāliah itech kowit. neh nochipa nikitita itech kāmpa, itech tepāmit. Kāmpa yōn kohkoyoktik tepāmit, ompa mokalakiah, ompa mochāntāliah. Nē tontōnal neh seki nikinahsik, nō ompa motāliah yōn tein piñilnekme nō ompa motāliah wān neh nimokayāw nē. Nimokayāw xā katka yehwa nēn piñilnekme pero kēman niah nikititāto ya nē pēwak moyōnih wān teltēsenkuih wān pēwak nē niki..., nikiowtia wān tak nikihtih sē wān nikihtekuih mahyá: yōn sakalimōn nēn iahwiākyo. Nō iwki ahwiāk ĩn okuiltsi:n. Wān nō mote..., kualtsīn mochāntia. Tamantik sah ichān, mahyá: yōn nochi takawih ika mochāntia pero nō kitālia, kāmpa mokalakia nō motēnchāntia kualtsīn kēmeh yōn piñilnekme mokalakia. Nō kualtsīn nē kitāliah inin.... Kāmpa ika kalakih nō kualtsīn motachihchīwiah, yēk ihkuitik yōn piñilnekme sayoh ke āmo kipia, yeh āmo, āmo yehwa yōn <i>cera</i> kēmeh piñilnekme, <i>sino que</i> mahyá: yōn takawih sah nēn, ika nēn motachihchīwiah. Wān nimitsilia pos</p>	<p><b>ADA:</b> <i>Yo también los conozco, se ve que todos son iguales estos animalitos pero no sé si habitan en los árboles. Yo siempre los he visto en, en la pared. En las aperturas de las paredes de piedra, ahí se meten y construyen su nido. Hace algunos días encontré a unos kuitanekmeh que también se ponen donde ponen su nido los piñilnekme y por eso me equivoqué. Me equivoqué pensando que eran piñilnekme, pero cuando ya me acerqué para verlos empezaron a alborotarse y amontonarse empecé a asustarlos para que se alejaran de mí y tal vez maté a uno porque [al acercarse mi mano a la cara], percibí una aroma como a zacate limón. También así es el olor de este animalito. Y también construye bien su nido. Su nido es raro, parece ser hecho todo de prepóleos, pero también construye su entrada bonita como la de los piñilnekme. También lo arreglan. Por donde entran también arreglan bonito, bien parecido a lo de los piñilnekme sólo que no tiene cera como lo de los piñilnekme sino que se arregla como si fuera de puro prepóleos.. Yo</i></p>