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[31]Price, George McCready: *loc. cit.*, pp. 109-114.
[32]Russell and Russell: *loc. cit.*, pp. 156-171.
[33]Crustal deformation caused by sinking.
[34]Water passages or mouths.
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[36]Trowbridge, Arthur C.: *loc. cit.*, p. 874.
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BOUNDARIES OF THE MIN: AN ANALYSIS OF THE MOSAIC LISTS OF CLEAN AND UNCLEAN ANIMALS*

ARTHUR J. JONES**

The Mosaic food lists are analyzed in detail and exhaustive lists of the genera covered by each Hebrew name are presented. The author shows that the ***min*** *generally lie at the family level (superfamily,* ***family,*** *subfamily) in current classification systems. An annotated bibliography is provided.*

Introduction

It was concluded in the first article ["A General Analysis of the Biblical Kind (Min)," CRS *Quarterly*, 9(1):53-57 (June, 1972)] that the Mosaic lists of clean and unclean animals do permit an analysis of the boundaries of the *min* ("kind").

The present article contains continued analysis of the lists in detail in order to determine where, in the modern hierarchy of biological categories (phylum, class, order, family, genus, species), the *min* would generally lie. I have endeavored to list under each Hebrew name all the species which would have been denoted.

I encountered considerable difficulty in this task because I initially did not know where to obtain certain information. In order to enable others to investigate this subject more readily I have appended a bibliography of all the literature which provided relevant information.

*Second in a series of articles dedicated to the memory of Dr. Jacobus Johannes Duyvené de Wit (1909-1965), late Professor of Zoology at the University of the Orange Free State, Bloemfontein, South Africa.

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Annotated Animal Lists

The size of the animal is indicated in parentheses. In the case of the clean *behemah* this is shoulder height/horn length. In all other cases the total (head to tail) length is given. If a second figure is given this is the *standard length* (which excludes the tail). All measurements are given in centimeters.

OUTLINE OF ANIMALS OF THE MOSAIC FOOD LISTS

1. *Behemah*

1.1. *Clean behemah*

1.1.1. *Domestic behemah* (Dt. 14:4).

a. *shor*—domestic cattle: ox, *Bos taurus* (100-140/variable); zebu, *Bos indicus*; buffalo, *Bubalus Bubalis* (170/150).

b. *kesebh*—domestic sheep: *Ovis aries* (c. 80/variable, often absent).

c. *'ez*—domestic goats: *Capra hircus* (c. 80/variable).

1.1.2. *Wild behemah of forest and field* (Dt. 14:5).

a. *'ayyal*—deer: red deer, *Cervus elaphus* (130/120); fallow deer, *Dama dama* (95/60); giant fallow deer, *Dama mesopotamica* (100/60); roe deer, *Capreolus capreolus* (65/25). All behemah with antlers (i.e. branched horns).

b. *tsebi*—gazelles: dorcas gazelle, *Gazella dorcas* (60/30); mountain gazelle, *Gazella gazella* (60/25); goitred gazelle, *Gazella subgutturosa* (65/35). *Behemah* of moderate size; very swift, leaping as they run; horns of moderate length, ringed and lyrate.

1.1.3. *Wild behemah of desert regions* (Dt. 14:5).

a. *yachmur*—hartebeests: bubal hartebeest, *Alcelaphus buselaphus* (135/35). Large *behemah* with upright, lyrate horns from a single large pedicel; horns with heavy rings.

On the basis of the Arabic, *yachmur* is often identified as the roe deer, but this is almost certainly incorrect.

b. *aqqo*—mountain goats: ibex, *Capra ibex* (80/90). Behemah of moderate size with long, slender, curved horns, the front surfaces bearing prominent transverse knobs.

c. *dishon*—antelopes: addax, *Addax nasomaculatus* (90/85). Also possibly the blackbuck, *Antilope cervicapra* (80/65). *Behemah* of moderate size; long horns in a straight line, but spirally twisted (corkscrewed).

d. *te'o*—oryx: *Oryx leucoryx* (90/70). *Behemah* of moderate size with long straight horns.

e. *zemer*—mountain sheep: mouflon or red sheep, *Ovis ammon* (includes *O. musimon* and *O. orientalis*) (70). Also possibly the barbary sheep, *Ammotragus lervia* (100/70). *Behemah* of moderate size with large spiralling horns.

1.2. *Unclean behemah*

1.2.1. *Behemah which chew the cud, but do not divide the hoof* (Lv. 11:4-6; Dt. 14:7).

a. *gamal*—camels: Arabian camel (dromedary), *Camelus dromedarius* (350).

b. *'arnebeth*—hares: cape hare, *Lepus capensis*; European hare, *Lepus europeus* (65); Arabian hare, *Lepus arabicus.*

c. *shapan*—hyraxes: rock hyrax, *Procavia capensis* (55).

1.2.2. *Behemah which divide the hoof, but do not chew the cud* (Lv. 11:7; Dt. 14:8). *chazir*—pigs (domestic and wild: *Sus scrofa* (140).

2. *Unclean birds*

2.1. *Predatory and scavenging land birds* (Lv. 11:13-17; Dt. 14:12-16).

a. *nesher*—griffon vultures: griffon, *Gyps fulvus* (100); Rüppell's griffon, *Gyps rüppellii* (90). *Not* the eagle which neither congregates round carrion (Jb. 39:30, Mt. 24:28) nor has the head and neck covered with creamy down instead of feathers (Mi. 1:16).

b. *peres*—vultures: bearded or golden vulture or lammergeier, *Gypaetus barbatus* (105); cinereus or black vulture, *Aegypius monarchus* (100); lappet-faced vulture, *Torgos tracheliotus* (95).

c. *'ozniyyah*—eagles: short-toed eagle, *Circaetus gallicus* (65); golden eagle, *Aquila chrysaetos* (85); imperial eagle, *Aquila heliaca* (80); Verreaux's eagle, *Aquila verreauxii* (80); steppe eagle, *Aquila nipalensis* (65); greater spotted eagle, *Aquila clanga* (70); lesser spotted eagle, *Aquila pomarina* (65); tawny eagle, *Aquila rapax* (70); white-tailed eagle, *Haliaetus albicilla* (80). Generic for all large eagles.

d. *'ayyah*—buzzards: long-legged buzzard, *Buteo rufinus* (65); common buzzard, *Buteo buteo* (55); honey buzzard, *Pernis apivorus* (55); eagles: Bonelli's eagle, *Hieraaetus fasciatus* (65); booted eagle, *Hieraaetus pennatus* (50); osprey: *Pandion haliaetus* (55); harriers: hen harrier, *Circus cyaneus* (50); pallid harrier, *Circus macrourus* (45); Montagu's harrier, *Circus pygargus* (45); marsh harrier, *Circus aeruginosus* (50); goshawk: *Accipiter gentilis* (55); falcons: saker falcon, *Falco cherrug* (45); lanner falcon, *Falco biarmicus* (45); peregrine falcon, *Falco peregrinus* (45); shaheen or Barbary falcon, *Falco pelegrinoides* (40). Generic for medium-sized birds of prey: buzzards, smaller eagles and large falcons.

e. *da'ah (dayyah)*—red kite, *Milvus milvus* (60); black kite, *Milvus migrans* (55).

Easily distinguished from the other birds of prey by the long angular wings, forked tails and buoyant, gliding flight.

f. *'orebh*—crows: raven, *Corvus corax* (55); fan-tailed raven, *Corvus rhipidurus* (50); hooded or carrion crow, *Corvus corone* (45); jackdaw, *Corvus monedula* (35); rook, *Corvus frugilegus* (45); jay, *Garrulus glandarius* (35); starlings: common starling, *Sturnus vulgaris* (21); spotless or Sardinian starling, *Sturnus unicolor* (21); Anatolian starling, *Sturnus purpurascens* (21); rose-coloured starling, *Sturnus (Pastor) roseus* (21); Tristram's grakle, *Onychognathus tristrami* (25). As a group name *'orebh* covers the large, black scavenging Passeres and their allies. The inclusion of the starlings is noted by Wood.[1]

g. *bath ya'anah*—eagle owl, *Bubo bubo* (55). This is the largest of the world's owls although the Palestine race is rather smaller than the largest (70). A solitary owl of wilderness and desert. NOT the ostrich (R.V., R.S.V.) which does not fit the habitats described, is too large to occur at this point in the list and is not, in any case, a flier. Two words are correctly translated *ostrich—ye'enim* (Lam. 4:3) and *renanim* (Jb. 39:13).

h. *tachmas*—barn or screech owl, *tyto alba* (40). A moderate-sized, noisy owl which is usually associated with farms and buildings.

i. *shachaph*—gulls and terns: glaucous gull, *Larus hyperboreus* (65); great black-headed gull, *Larus ichthyaetus* (60); herring gull, *Larus argentatus* (55); lesser black-backed gull, *Larus fuscus* (50); Audouin's gull, *Larus audouinii* (50); slender-billed gull, *Larus genei* (45); common gull, *Larus canus* (40); white-eyed gull, *Larus leucophthalmus* (40); Mediterranean or great black-headed gull, *Larus melanocephalus* (40); black-headed gull, *Larus ridibundus* (40); little gull, *Larus minutus* (30); Caspian tern, *Hydroprogne tschegrava* (50); swift tern, *Sterna bergii* (50); Sandwich tern, *Sterna sandvicensis* (40); lesser crested tern, *Sterna bengalensis* (40); lesser sooty or bridled tern, *Sterna anaethetus* (35); common tern, *Sterna hirundo* (35); little tern, *Sterna albifrons* (25); gull-billed tern, *Gelochelidon nilotica* (40); whispered tern, *Chlidonias hybrida* (25); black tern, *Chlidonias niger* (25); white-winged black tern, *Chlidonias leucopterus* (25).

G. R. Driver[2] rejects the interpretation, "gull," since this is not the water bird section of the list. This action is, however, unwarranted. Many gulls are raptorial (e.g. the great black-headed; also the Caspian and black terns) and several species are usually found inland—even in desert regions where they feed on snails (e.g. the black-headed and lesser black-backed gulls). See Tristram[3] and Meinertzhagen[4] *in loc.*

j. *nets*—hawks: Levant sparrowhawk, *Accipiter brevipes* (35); sparrowhawk, *Accipiter nisus* (30); shikra, *Accipiter badius* (25); black-shouldered kite, *Elanus caeruleus* (30)—quite unlike a kite in behavior; falcons: Eleonora's falcon, *Falco eleonorae* (40); hobby, *Falco subbuteo* (35); kestrel, *Falco tinnunculus* (35); sooty falcon, *Falco concolor* (35); lesser kestrel, *Falco naumanni* (30); red-footed falcon, *Falco vespertinus* (30); merlin, *Falco columbarius* (30), Generic for all the smaller hawks and falcons.

k. *kos*—little owl, *Athens noctua* (20). An owl of deserts and ruins, often seen during the day, noisy.

l. *yanshuph*—Scops owl, *Otus scops* (includes pallid or striated Scops, *Otus brucei*) (19). Found near human habitation. Distinctive but monotonous song.

2.2. *Long-toed marsh birds* (Lv. 11:18; Dt. 14:16); *tinshemeth*—rails and coots; purple gallinule, *Porphyrio porphyrio* (50); coot, *Fulica atra* (40); moorhen, *Gallinula chloropus* (35); water rail, *Rallus aquaticus* (27); corncrake or landrail, *Crex crex* (26).

2.3. *Short-legged water birds* (Lv. 11:17, 18; Dt. 14:17).

a. *qa'ath*—pelicans: white pelican, *Pelecanus onocrotalus* (165); Dalmatian pelican, *Pelecanus crispus* (175). Very long hooked bill with a large distensible throat pouch (crop). Flies with head carried well back on the shoulders. Highly gregarious. Not a diver. The Hebrew name, "the Vomiter" (from *qo'*, "to vomit") relates to their habit of regurgitating from the throat pouch partly digested food for their young.

b. *racham*—Egyptian vulture, *Neophron percnopterus* (65).

c. *shalakh*—cormorants: pygmy cormorant, *Phalacrocorax pygmaeus* (50); cormorant, *Phalacrocorax carbo* (90). Long slender hooked bill. Short wings, flying

with the long neck extended. Gregarious. A diver.

2.4. *Long-legged water birds* (Lv. 11:19; Dt. 14:18).

a. *chasidah*—storks: white stork, *Ciconia ciconia* (100); black stork, *Ciconia nigra* (95); Marabou stork, *Leptroptilus crumeniferus* (105). Long pointed bill. Long broad wings, flying with the long neck extended. Gregarious. A very conspicuous migrant (Je. 8:7). Mixed feeders. The Marabou stork is quite vulturine in its habits.

b. *'anaphah*—herons and bitterns: goliath heron, *Ardea goliath* (140); grey heron, *Ardea cinerea* (90); purple heron, *Ardea purpurea* (80); squacco heron, *Ardeola ralloides* (45); buff-backed heron or cattle egret, *Bubulcus ibis* (50); great white egret or heron, *Egretta alba* (90); little egret, *Egretta garzetta* (55); bittern, *Botaurus stellaris* (75); little bittern, *Ixobrychus minutus* (35); night heron, *Nycticorax nycticorax* (60). As a group name *'anaphah* covers all the long-legged, wading water birds and their allies. The Hebrew name (cf. *'aph* "nose") probably refers to the prominent, variously shaped bills. There are so many of these birds on the Palestine list that in some cases only the genera are listed:

Spoonbills and Ibises (Threskiornithidae): spoonbill, *Platelea leucorodia* (85); sacred ibis, *Threskiornis aethiopicus* (65); glossy ibis, *Plegadis falcinellus* (55); Flamingos (Phoenicopteridae): greater flamingo, *Phoenicopterus ruber* (125); Cranes (Gruidae): grey crane, *Grus grus* (115); demoiselle crane, *Anthropoides virgo* (100); Stilts (Recurvirostridae): black-winged stilt, *Himantopus himantopus* (40); Sandpipers, Godwits, Curlews, Snipe (Scolopacidae): curlew, *Numenius arquata* (55); sandpipers, *Tringa spp.* (28-30), *Calidris* spp. (13-20); woodcock, *Scolopax rusticola* (35); snipe, *Gallinago* spp. (26-27); ruff, *Philomachus pugnax* (26); Jack snipe, *Lymnocryptes minima* (19); godwits,*Limosa spp.* (40); Thick-knees (Burhinidae): stone curlew, *Burhinus oedicnemus* (40); Plovers (Charadriidae); lapwing, *Vanellus vanellus* (30); spur-winged plover, *Vanellus spinosus* (26); plovers, *Charadrius* spp. (15-20), *Pluvialis spp.* (27-28); dotterel, *Eudromias morinellus* (20); Coursers (Glareolidae): cream-coloured courser, *Cursorius cursor* (23); Phalaropes (Phalaropidae): grey phalarope, *Phalaropus fulicarius* (20). Doubtless other genera should be added to this list.

2.5. *Hoopoes* (Lv. 11:19; Dt. 14:18); *dukhipath*—hoopoe, *Upupa epops* (28).

2.6. *Bats* (Lv. 11:19; Dt. 14:18); *'atalleph*—bats: (Megachiroptera, Pteropidae) Egyptian fruit bat or Rousette, *Rousettus aegyptiacus* (18)[5]; (Microchiroptera, Emballonuroidea, Rhinopomatidae) greater mouse-tailed bat, *Rhinopoma microphyllum* (15); lesser mouse-tailed bat, *Rhinopoma hardwickei* (14); (Emballonuridae) naked-bellied tomb bat, *Taphozous nudiventris* (13); tomb bat, *Taphozous perforatus* (10); (Rhinolophoidea, Nycteridae) Egyptian slit-faced bat, *Nycteris thebaica* (11); (Rhinolophidae) greater horseshoe bat, *Rhinolophus ferrum-equinum* (10); lesser horseshoe bat, *Rhinolophus hipposideros* (7); Mediterranean horseshoe bat, *Rhinolophus euryale* (8); *Rhinolophus clivosus* (9); *Rhinolophus blasii* (8); (Hipposideridae) trident leaf-nosed bat, *Asellia tridens* (9); (Vespertilionoidea, Vespertilionidae) barbastelle, *Barbastella barbastellus* (9); Arabian barbastelle, *Barbastella leucomelas;* serotine, *Eptesicus serotinus* (13); Botta's serotine, *Eptesicus bottae* (11); long-winged bat, *Miniopterus schreibersi* (12); notch-eared bat, *Myotis emarginatus* (9); whiskered bat, *Myotis mystacinus* (9); Daubenton's or water bat, *Myotis daubentoni* (8); Nattcrer's bat, *Myotis nattereri* (9); greater mouse-eared bat, *Myotis myotis* (14); lesser mouse-eared bat, *Myotis blythi* (13); long-fingered bat, *Myotis capaccinii* (9); Hemprich's long-eared bat, *Otonycteris hemprichi* (18); Kuhl's pipistrelle, *Pipistrellus kuhli* (9); Nathusius' pipistrelle, *Pipistrellus nathusii* (9); Rüppell's pipistrelle, *Pipiserellus ruppelli;* common pipistrelle, *Pipistrellus pipistrellus* (8); Bodenheimer's pipistrelle, *Pipistrellus bodenheimeri* (8); noctule, *Nyctalus noctula* (13); grey long-eared bat, *Plecotus austriacus* (9); particolored bat, *Vespertilio murinus* (10); Schlieffer's bat, *Nycticeius schliefferi* (8); (Molossidae) European free-tailed bat, *Tadarida teniotis* (14); Egyptian free-tailed bat, *Tadarida* aegyptiaca (12).

3. *Clean insects* (Lc. 11:22).

a. *'arbeh*—desert locust, *Schistocerca gregaria* (6-7); migratory locust, *Locusta migratoria* (3-6); Egyptian grasshopper, *Anacridium aegyptium* (3-6); Generic for all the large, short-horned, swarming

grasshoppers which are a threat to crops.[6] *'arbeh* strictly denotes "crowd," "swarm."[7]

b. *Sol'am*—The rendering "bald locust" (AV, RV, RSV) is based on Talmudic and Rabbinical statements that the head is long and smooth (bald).[8] This clearly refers to such short-horned forms as *Acrida* and *Acridella* and thus to the Acridinae-Truxalinae group of Acrididae. These subfamilies include the majority of Palestine Acrididae, so as a group name *sol'am* probably denotes all the short-horned grasshoppers which are more or less solitary (doubtless including the solitary phases of the locusts).

c. *chargol*—This term seems to be derived from a root meaning, "to run swiftly"[9] or "to leap in going."[10] This suggests another group of solitary forms, probably those long-horned grasshoppers and crickets which fulfill the above conditions. These are distinguished from the preceding not only by the long antennae, but also by the presence in the female of a long ovipositor ("tail")—the acridids have short, stubby ovipositors (no "tail"). Aharoni[11] suggests *Tettigonia viridissima* (7) as the main form.

d. *chaghabh*—Moroccan locust, *Dociostaurus maroccanus* (2-3); Palestinian locust, *Calliptamus palestinensis* (1.5-3.5). Generic for all the small, short-horned, swarming grasshoppers which are a threat to crops.[12] *Chaghabh* is possibly derived from a root meaning, "to hide," i.e. swarms covering the ground or sky?[13]

In the absence of specific information I have been unable to give a full list of genera under each name. All I can do is list the Palestine *Saltatoria* here and leave it to others to give us a fuller analysis:

Tettigonioidea: Tettigoniidae (long horned grasshoppers) *Tettigoniinae*: Tettigonia, Metrioptera; *Decticinae*: Pholidoptera, Medecticus, Festella, Paradrymadusa; *Saginae*: Saga; *Phaneropterinae*: Isophya, Tylopsis, Acrometopa; *Conocephalinae*: Conocephalus.

Gryllacridoidea: Lezinidae (cave crickets) Lezina.

Grylloidea: Gryllotalpidae (mole-crickets) Gryllotalpa.

Grylloidea: Gryllidae (crickets) *Gryllinae*: Gryllus, Acheta, Tartarogryllus. Modicogryllus, Gryllopsis, Paragryllopsis, Gryllomorpha; *Nemobiinae*: Pteronemobius; *Eremogryllodinae*: Eremogryllodes.

Grylloidea: Myrmecophilidae (ant crickets) Myrmecophila.

Grylloidea: Mogoplistidae: Arachnocephalus.

Grylloidea: Oecanthidae: Oecanthus.

Grylloidea: Trigonidiidae: Trigonidium, Anaxipha.

Tetrigoidea: Tetrigidae (pygmy or grouse locusts) Acrydium, Paratettix.

Tetrigoidea: Tridactylidae (pygmy mole-crickets) Tridactylus.

Acridoidea: Pyrgomorphidae: Pyrgomorpha, Pyrgomorphella, Poecilocerus.

Acridoidea: Pamphagidae, *Akicerinae & Pamphaginae*: Tmethis, Orchamus, Prionosthenus.

Acridoidea: Acrididae (short-horned grasshoppers) *Dericorythinae*: Dericorys; *Tropidopolinae*: Tropidopola; *Calliptaminae*: Calliptamus, Kripa Sphodromerus; *Eyprepocnemidinae*: Eyprepocnemis, Paraeuprepocnemis, Thisoicetrus; *Cantantopinae:* Pezotetix, Podisma; *Cyrtacanthacridinae*: Anacridium, Schistocerca; *Acridinae* (includes *Oedipodinae* and *Truxalinae*): Acrida, Acridella, Durionella, Platypterna, Aiolopus, Morphacris Oedipoda, Locusta, Acrotylus, Spingonotus, Leptopternis, Hyalorrhipis, Pyrodera, Helioscirtus, Mioscirtus, Scintharista, Bodenheimerella, Chorthippus, Dociostaurus, Eremippus, Ramburiella.

4. *Unclean land swarmers*

4.1. *Small carnivores* (Lv. 11:29); *choledh*—weasel, *Mustela nivalis* (36/29); marbled polecat, *Vormela peregusna* (50/30); Egyptian mongoose or ichneumon, *Herptestes ichneumon* (50/25); also possibly the beech or stone marten, *Martes foina* (65/44); European genet, *Genetta genetta* (80/40) and the small desert fox, *Fennecus zerda* (60/40): Generic for small carnivores. Not the mole rat (*chaphar-parah* Is. 2:20).

4.2. *Small rodents* (Lv. 11:29); *'akhbar*—(Sciuridae, Sciurinae) sousliks: *Citellus;* (Cricetidae, Cricetinae) common hamsters, *Cricetus;* Eurasian hamsters, *Cricetulus;* golden hamsters, *Mesocricetus;* (Cricetidae, Microtinae) common field voles, *Microtus;* (Cricetidae, Gerbillinae) smaller gerbils, *Gerbillus*; jirds, *Meriones* (including the bushy-tailed jirds, *Sekeetamys*); fat sand rats, *Psammomys;* (Spalacidae) mole rats, *Spalax;* (Muridae, Murinae) field mice, *Apodemus;* Nile rats, *Arvicanthus;* rats, *Rattus*; house mice, *Mus;* spiny mice, *Acomys;* short-tailed bandicoots or mole rats, *Nesokia;* (Gliridae, Glirinae) fat dormice, *Glis*; garden dormice, *Eliomys,* forest dormice, *Dryomys*; (Dipodidae, Dipodinae) jerboas, *Jaculus,* five-toed jerboas, *Allactaga.* Generic for all small rodents.

4.3. *Lizards* (Lv. 11:29-30)

a. *tsab*—desert monitor, *Varanus grisseus* (130/55); Nile monitor, *Varanus niloticus* (160/65); mastigure or spiny-tailed lizard, *Uromastix aegyptius* (100/55); *Uromastix ornatus*. Generic for the very large desert lizards. The monitors are carnivores. The mastigures seem to be strictly herbivorous, but this would hardly be guessed from their fierceness.[14] The Arabic *dhabb* denotes the mastigures.

Not the tortoise (AV., modern Hebrew. The tortoise is so very similar to the turtle (a water swarmer without scales and fins—hence unclean) that it would not need to be mentioned.

b. *'anaqah*—rock geckos, *Ptyodactylus* (c. 15/8); house geckos, *Hemidactylus* (c. 10/5.5); *Alsophylax* (c. 10/5.5); wall geckos, *Tarentola* (c. 20/10); naked-toed geckos, *Gymnodactylus* (c. 10/4.5); bent-toed geckos, *Cyrtodactylus* (c. 10/4.5); *Stenodactylus* (c. 10/6); *Ceramodactylus* (c. 10/6.5); *Tropiocolotes* (c. 10/4.5). Generic for geckos.

c. *koach*—rainbow lizard or hardoun, *Agama stellio* (30/11). At least half a dozen other species of agamid (all *Agama*, c. 15-30/6-11) are known from the region, but the hardoun is by far the commonest.[15] Generic term for the agamids: broad, flat lizards with short extremities which run with the body erect in a very characteristic fashion.

d. *leta'ah*—common lizard, *Lacerta laevis* (20/8); green lizard, *Lacerta viridis* (50/14); wall lizard, *Lacerta muralis* (20/7); European fence lizard, *Lacerta agilis* (20/8); a few other *Lacerta* (c. 20); fringe-toed lacertids, *Acanthodactylus* (c. 20/8); desert lacertids, *Eremias* (c. 15/5); snake-eyed lacertids, *Ophisops* (c. 15/5). General term for all medium sized and small lizards of typical lizard shape.

e. *chomet*—skinks, *Scincus* (c. 20/12); mabuyas, *Mabuya* (c. 20/8); *Eumeces* (c. 40/17); cylindrical skinks, *Chalcides* (c. 25/15); lidless skinks, *Ablepharus* (c. 10/5); Asian sand skinks, *Ophiomorus* (c. 15/10). General term for all the snake-like lizards with short legs (sometimes absent) and tapered heads, which move through dry sand with a characteristic swimming motion.

f. *tinshemeth*—chameleon, *Chamaeleo chamaeleon* (30/15). Tail long and prehensile, curled downwards like a catherine wheel. A quite unmistakeable lizard! The Hebrew *tinshemeth* is used of two animals in these lists—c.f. English, "turtle" (turtle, turtle dove) and "ichneumon" (insect, small carnivore).

Comments Concerning the Outline

1. Camels. The camel is the only true ruminant which is not cloven-hoofed. The toes end in broad nails and the weight is carried on broad cushions behind.

2. The Hare. Since the hare does not possess hooves at all it is, on the face of it, surprising that it should be classed as a *behemah*. It looks more like a rodent and for a long time the lagomorphs (rabbits, hares, pikas) were indeed regarded as *Rodentia*. However, the sharp differences from the rodents and the similarities to the hoofed animals which they *do* possess demanded recognition and in 1912 they were formally separated from the *Rodentia*. All in all they are a conundrum to the evolutionist.[16]

Although lagomorphs are not true cud-chewers they do show a form of pseudo-rumination (reingestion).[17]

3. The Hyrax. In general appearance and habits, the hyrax resembles the rodents and was originally classified with them. But, after being placed near the rhinoceroses for a long time, it has now been positioned in an isolated order. There are similarities to the lagomorphs and to the ungulates (some extinct forms were as large as pigs)—another major conundrum for the evolutionist.[18] Each digit ends in a tiny hoof-like nail. Like the hare, the hyrax is not a true cud-chewer, indicating that the Hebrew "chew the cud" means simply "chew again" rather than our scientific analysis in terms of the specialized four-chambered ruminant stomach.

Although this is not a scientific listing it is certainly ramarkable that in the Mosaic classification the hare and the hyrax were placed with the hoofed animals and not with the rodents.

4. The Vultures. It is unfortunate that we have such a low view of the vulture for in all its movements it is a majestic bird far surpassing the eagle in size and power.

Although quite dissimilar in flight silhouette, the three species, bearded vulture, black vulture, and lappet-faced vulture, share several features which unite them as a separate group from the griffons. They are all solitary birds of the remote mountains and plains (of the desert edge), whereas the griffons are more sociable and range over all types of country. They do not compete with the griffons, but wait until the griffons have finished with a carcas, and then take over the bones. They carry the bones aloft and drop

them on rocks in order to break them open and expose the marrow (Hebrew *peres* from *paras* "to break," i.e. "the breaker"). Whole animals (esp. tortoises) are treated in similar fashion.

Some scholars separate the vultures from the eagles and hawks as a distinct family—Aegypiidae—with two subfamilies, Gypaetinae (for the lammergeier) and Aegypiinae (for the rest). The vultures do seem to be a distinct kind: a thorough investigation is needed.

5. Falcons. The falcons (genus *Falco*) divide fairly readily into two groups: the large falcons of desert or semi-desert which kill their prey by swooping on it at enormous speed and the smaller falcons of open forest and town which pursue smaller prey. The latter group belongs under *nets.*

6. Egyptian Vulture—rachamun. G. R. Driver[19] rejects this identification (despite the Arabic *rachamun,* "white carrion vulture") since vultures were already dealt with earlier in the outline and this is the water bird section of the list. But it must be emphasized again that this list is serving a practical purpose, not a scientific one.

Even though *Neophron* is a vulture it slots in well at this point. On the one hand its small size and thin bill set it apart from the other vultures making it difficult to include it earlier in the list.

Also, it has many characteristics which might allow placing it with the water birds: its black and white coloration (pelicans, storks); its hooked bill (pelicans, cormorants); its massive wings (pelicans, storks); its method of feeding its young by regurgitation (pelican); its flight pattern (very similar to the stork's); it is seen in great flocks[20]; it is omnivorous (storks and herons are mixed feeders), the diet including live crustacea taken from the water; it is often seen with the flocks of water birds (especially pelicans) and like the stork it is noted for its devotion to its mate and young. All in all I can see no valid reason to doubt the interpretation that *rachamun* refers to the Egyptian Eagle.

7. Bats. Despite the large number of species the bats are a very homogeneous group both in appearance and in anatomy. Linnaeus[21] classified the seven bats known to him into a single genus *(Vespertilio)* of his order Primates—bats that are now placed in two suborders, four superfamilies and five families!

The modern families (17 in all) are certainly of far smaller scope than in most mammalian orders and there are almost certainly less "kinds" than families (possibly no more than five). Note that this reference demonstrates that the Hebrew *tsippor* covers all vertebrate winged fliers and not just birds.

8. Clean Insects. Lack of information makes this the most difficult section of the list.

In the literature available to me only Bodenheimer,[22] Rivnay,[23] and Chopard[24] discuss the *Orphoptera* of Bible lands but they give no details for other than a few important crop pests. I am primarily a vertebrate zoologist and not at all familiar with either the insects or the literature. Consequently the analysis presented here must be regarded as preliminary.

To be counted as clean an insect must fulfill certain conditions:

(1) It must be a winged flier, i.e. apterous or near-apterous forms (e.g. *Festella, Prionosthenus)* are excluded.

(2) It must have a hind pair of jumping legs, i.e. forms which do not have these legs (non-orthopterans) or do not employ them for leaping (e.g. *Saga*) are excluded.

(3) It must be primarily herbivorous, i.e. forms which are primarily predacious or omnivorous (e.g. many long-horned grasshoppers) are excluded.

Thus it is mainly the short-horned grasshoppers (Acridoidea)—the dominant group of Orthoptera in Bible lands—that are clean.

9. Conclusions. The analysis of the outline is summarized in Table One. It is immediately clear that in vertebrates the *min* of the Mosaic food lists generally lie at the family level in current classification systems. In the case of the *Orthoptera,* however, the sub-family would often seem to be the *min* grouping. However, there has been a marked tendency over the past decades to elevate Orthopteran subfamilies to the rank of families. So the difference may only reflect the inadequacy of present classifications. (Perhaps an entomologist could comment?)

The use of the word *min* in these Mosaic food lists certainly precludes the possibility of reading theistic evolution into the Biblical account. Many *min* are mentioned—not just one or a few as evolutionists would demand. Thus creation "after their kinds" must have involved the rapid appearance of numerous discrete and unrelated groups of animals.

It may be argued that the word *min* is more inclusive or perhaps exclusive as it is used here than it is in the context of Genesis chapter I. In a previous article[25] I have shown that *min* is a precise technical term. It is therefore unlikely that there is any difference.

Genesis I states that God created many *min* (the word is collective) of beasts, of cattle, of creping things, etc. If Moses had been asked to give instances of *min,* I feel certain that his answer would have been in line with what we have learnt from the food lists.

In the "kind creation concept" however, there is still room for some modification within the boundaries of one *min.* The late Dr. J. J. Duy-

Table I: The Animals of the Mosaic Food Lists

	Hebrew	Family	Subfamily	Genus	Species	Vernacular
1.	*shor*	Bovidae	Bovinae	Bos, Bubalus	3 spp	cattle
2.	*kesebh*	Bovidae	Caprinae	Ovis	aries	sheep
3.	*'ez*	Bovidae	Caprinae	Capra	hircus	goat
4.	*'ayyal*	Cervidae	Cervinae	Cervus, Dama	3 spp	deer
			Odocoileinae	Capreolus	capreolus	roe deer
5.	*tsebi*	Bovidae	Antilopinae	Gazella	3 spp	gazelle
6.	*yachmur*	Bovidae	Hippotraginae	Alcelaphus	buselaphus	hartebeest
7.	*aqqo*	Bovidae	Caprinae	Capra	ibex	wild goat
8.	*dishon*	Bovidae	Hippotraginae	Addax	nasomaculatus	Addax
9.	*te'o*	Bovidae	Hippotraginae	Oryx	leucoryx	Oryx
10.	*zemer*	Bovidae	Caprinae	Ovis	ammon	wild sheep
11.	*gamal*	Camelidae		Camelus	dromedarius	camel
12.	*'arnebeth*	Leporidae	Leporinae	Lepus	3 spp	hare
12.	*shaphan*	Procaviidae		Procavia	capensis	hyrax
14.	*chazir*	Suidae		Sus	scrofa	pig
15.	*nesher*	Accipitridae	Aegypiinae	Gyps	2 spp	vulture
16.	*peres*	Accipitridae	Aegypiinae	3 genera	3 spp	vulture
17.	*'ozniyyah*	Accipitridae	Buteoninae	2 genera	8 spp	eagle
			Circaetinae	Circaetus	gallicus	eagle
18.	*'ayyah**	Pandionidae		Pandion	haliaetus	osprey
		Accipitridae	Perninae	Pernis	apivorus	buzzard
			Accipitrinae	Accipiter	gentilis	goshawk
			Buteoninae	2 genera	4 spp	buzzard
			Circinae	Circus	4 spp	harrier
		Falconidae	Falconinae	Falco	4 spp	falcon
19.	*da'ah (dayyah)*	Accipitridae	Milvinae	Milvus	2 spp	kite
20.	*'orebh**	Corvidae		2 genera	6 spp	crow
		Sturnidae		2 genera	5 spp	starling
21.	*bath ya'anah*	Strigidae	Buboninae	Bubo	bubo	eagle owl
22.	*tachmas*	Tytonidae	Tytoninae	Tyto	alba	barn owl
23.	*shachaph*	Laridae		5 genera	22 spp	gull
24.	*nets**	Accipitridae	Elaninae	Elanus	caeruleus	'kite'
			Accipitrinae	Accipiter	3 spp	hawk
		Falconidae	Falconinae	Falco	7 spp	kestrel
25.	*kos*	Strigidae	Buboninae	Athene	noctua	little owl
26.	*yanshuph*	Strigidae	Buboninae	Otus	scops	Scops owl
27.	*tinshemeth*	Rallidae		5 genera	5 spp	rail
28.	*qa'ath*	Pelecanidae		Pelecanus	2 spp	pelican
29.	*racham*	Accipitridae	Aegypiinae	Neophron	percnopterus	vulture
30.	*shalakh*	Phalacrocoracidae		Phalacrocorax	2 spp	cormorant
31.	*chasidah*	Ciconiidae		2 genera	3 spp	stork
32.	*'anaphah**	Ardeidae		7 genera	10 spp	heron
		9 other families		22 genera		waders
33.	*dukhiphath*	Upupidae		Upupa	epops	hoopoe
34.	*'atalleph*	8 families		17 genera	36 spp	bat
35.	*'arbeh**	Acrididae	Cyrtacantha-cridinae	Schistocerca	gregaria	locust
				Anacridium	aegyptium	grasshopper
			Acridinae	Locusta	migratoria	locust
36.	*sol'am**	Acrididae	several sub-families			grasshopper
37.	*chargol**	Tettigoniidae				grasshopper
		Gryllidae?				cricket
38.	*chaghabh**	Acrididae	Calliptaminae	Calliptamus	palestinensis	locust
			Truxalinae	Dociostaurus	maroccanus	locust
39.	*choledh*	Mustelidae	Mustelinae	2 genera	2 spp	weasel
		Viverridae	Herpestinae	Herpestes	ichneumon	ichneumon
40.	*'akhbar*	6 families	8 subfamilies	20 genera		rodent

Table I: The Animals of the Mosaic Food Lists *(Continued)*

	Hebrew	Family	Subfamily	Genus	Species	Vernacular
41.	*tsab**	Varanidae		Varanus	2 spp	monitor
		Agamidae		Uromastix	2 spp	mastigure
42.	*'anaqah*	Gekkonidae		9 genera		gecko
43.	*koach*	Agamidae		Agama		lizard
44.	*leta'ah*	Lacertidae		4 genera		lizard
45.	*chomet*	Scincidae		6 genera		skink
46.	*tinshemeth*	Chameleontidae		Chamaeleo	chamaeleon	chameleon

vené de Wit suggested that the Lord endowed each kind with a rich genetic potential. Before the Fall (and its outworking in the Flood) this potential would have permitted a wealth of variety in plants and animals.

After the Fall it also provided the biological basis for variation and selection to meet the vicissitudes of a changing and often hostile environment. Yet such selection can only produce variations on the original themes—no new kind can be formed nor can the boundaries of any kind be transgressed.

Does this mean that all the animals of one *min* are related by descent? The Bible does not require this and in fact the accounts would seem to imply a different situation.

The only creature of which interrelationship by descent is definitely true—man—is not regarded as a *min* at all (note the contrast in Genesis I between the animals and plants which were created *according to their min* and man who was created *in the image of God*).

Further the parallel term to *min* in relation to man is *mishpachah* ("family") which denotes political, extrinsic relationship *not* genetic, intrinsic relationship.[26] I would thus suggest that each *min* contains several created stocks (although these may have subsequently intermingled), and that therefore the unity of the *min* is not one of descent.

There is thus a wide open field for creationist research: What is the basis of the unity of a min? What criteria can be used to distinguish min? Can all the members of the same *min* interbreed? If not how has reproductive isolation developed? What processes of variation can occur? Speciation (in the present day sense) does occur, but what processes are involved and how do these relate to the integrity of the *min*?

Dr. de Wit initiated a project to study these questions and carried out some fundamental research. I have been working in the same field and I hope to survey the progress in a later article. But the work remains unfinished.

It is hoped that this present analysis of the word *min* in the Mosaic lists will stimulate the gentic research needed to answer these questions. The current evolutionary frameworks have had a stultifying effect on biological science and they greatly hinder research.

Yet, we do not have an accepted creationist alternative! I believe that we are now in a position to develop such an alternative that we may work further towards the reformation of biology.

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BRASSY SERPENTS ASSIGNED ROLE OF GUINEA WORMS

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Many facts are presented to establish the position that the brazen serpents which bit the children of Israel in the wilderness of the Arabian desert were literal venomous snakes, and not guinea worm attacks as stated in parasitology textbooks. The miracle of instantaneous healing from a look at a brass snake on a pole is readily understood in light of John 3:14, 15.

> And the people spake against God, and against Moses, Wherefore have ye brought us up out of Egypt to die in the wilderness: for there is not bread, neither is there any water; and our soul loatheth this light bread.
>
> And the Lord sent fiery serpents among the people, and they bit the people; and much people of Israel died. Therefore the people came to Moses, and said, We have sinned, Lord, and against thee; pray unto the Lord,

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