SOME RUSSIAN CONTRIBUTIONS TO TAXONOMY
AND NOMENCLATURE OF THE VIRUSES

A Review

Robert S. Breed and A. Petraitis
New York State Experiment Station,
Geneva, New York, USA.

Zhdanov, V.M. *Opredelitel' Virusov Celovska i Zivotnykh*
(Guide to the Human and Animal Viruses). Izdalestro Akademii Medicinskikh Nauk. USSR. Moskau 1953. Publisher Acad. Med. Sci. USSR, Moscow, 1953 (June 9) 348 pp.

The recent book by Zhdanov(1953) calls sharply to our attention the fact that in recent years there have appeared several Russian contributions relative to the classification and nomenclature of the viruses. The work of the Russian scientists is but poorly known outside Russia, largely because of difficulty in securing the literature. In a series of reports and books there is proposed new Linnaean nomenclature in classifications of rickettsias and viruses.

Zhdanov's treatise groups all of the rickettsias and viruses into a phylum *Vira* Zhdanov and Korenblut 1949, ignoring the earlier use of this name by Holmes (1939) for substantially the same group. Three classes are recognized, the Proto-phytoviralis, Phytoviralia, and the Zooviralia for the bacterial viruses, the plant viruses, and the animal viruses respectively. Zhdanov does not further discuss the bacterial or plant viruses, elaborating only the classification of the Zooviralia. The essential feature is that the rickettsias, the bartonellas and the chlamydozoa are grouped with the filterable viruses. Names of these taxa as given in the 6th (1948) edition of the Bergey Manual are regularly cited, frequently, however, as synonyms of new names (given by Russians) quite certainly not having priority. In some cases the author of a name is incorrectly given, i.e. the ordinal name Rickettsiales is ascribed to Bengston.

The proposed classification and names of Zhdanov should be made available to non-Russian readers. They are outlined and listed below. No attempt has been made to indicate the

numerous errors in nomenclature. The synonymy given by Zhdanov will enable the reader to interpret reasonably well the characteristics of the several groups (taxa).

The book has a brief editorial foreword and preface which may be paraphrased as follows:

"From the Editor's Office" (page 2)

The demand for the development of a classification and for a system of naming viruses is very real. The abundant data that have been gathered need to be surveyed and systematized.

The author takes the responsibility for having prepared the classification of viruses from the standpoint of Russia.

The overall problems of classification and of development of viruses are reviewed in the first part of the book. The author has found it necessary to make some hypothetical assumptions, for knowledge of the natural evolution and properties of viruses is still inadequate.

The evolution of viruses is developed here for the first time in detail in the literature. In the second part of the text full descriptions are given of the viruses known. This review presents not only our own (Russian) literature but also that of the entire world.

The discussions which will arise as a result of the publication of this book should bring new improvements and should lead to a development of a general Soviet approved classification based on the present biologic concepts of Michurin.

Author's Preface (page 3)

The science of viruses, which had its beginning in Russia, has grown during recent decades into an independent scientific discipline. One part of virology that has developed is a classification and nomenclature. The need for preparing a Soviet classification and nomenclature of viruses arises from the progress made in the development of general virology and from practical necessity. This need is still greater because a classification has been published abroad (e.g. the classification by Holmes in the 6th edition of Bergey's Manual of Determinative Bacteriology). This is drawn upon a

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foolish basis, and there is danger that it will be accepted without critical analysis.

A tentative classification and nomenclature of viruses is given from the viewpoint of our own country (Russia) in the present book. The place of viruses among living organisms and their evolution is discussed in the first part together with a review of the literature covering the classification and nomenclature of viruses as written by various authors. In the second part descriptions of the species of viruses are given as taken from the literature.

The author fully realizes that his arrangement is imperfect and tentative. He will appreciate courteous criticisms.

The classification of the phylum Vira as detailed by Zhdanov is outlined below. The page number of the treatise on which names and synonymy are given ends each citation. As noted above, there are no corrections even of obvious errors.

VIRA. V.H. Zhdanov and R.S. Korenblut (p. 147)

- Class I. Protophytoviralia class. nov. (p. 147)
 Class II. Phytoviralia class. nov. (p. 147)
 Class III. Zooviralia class. nov. (p. 148)

Order I. Rickettsiales Bengston 1948 (p. 149)

Family I. Rickettsiaceae Pinkerton 1936 (p. 149)

Genus I. Rickettsia da Rocha-Lima 1916 (p. 150)

Subgenus I. Rickettsia Z. and K. 1949 (p. 151)

1. Rickettsia prowazeki da Rocha-Lima 1916 (da Rocha-Lima 1916). (Rickettsia exanthematotypi Kodama 1932: Rickettsia prowazeki var. prowazeki Pinkerton 1936; Rickettsia prowazeki subspecies prowazeki Philip 1943). (p. 151).

2. Rickettsia mooseri Monteiro 1931 (Wolbach et Todd, 1920) (Dermacentroxenus typhi Wolbach et Todd 1920; Rickettsia manchuriae Kodama et al. 1932; Rickettsia murina Megaw 1953; Rickettsia fletcheri Megaw 1935; Rickettsia prowazeki var. mooseri Pinkerton 1936; Rickettsia prowazeki subspecies typhi Philip 1943; Rickettsia typhi 1943) (p. 153).

Subgenus 2. Ixodoxenus nom. nov. (Dermacentroxenus Z. and K. 1949) (p. 155).

1. Ixodoxenus rickettsi comb. nov. (Ricketts 1909) (Dermacentroxenus rickettsi Wolbach 1919; Rickettsia rickettsi Brumpt 1922; Rickettsia brasiliensis Monteiro 1931; Rickettsia typhi Amaral et Monteiro 1933; Dermacentroxenus rickettsi var. brasiliensis Pinkerton 1936). (p. 155).

2. Ixodoxenus conori comb. nov. (Brumpt 1932) (Rickettsia conorii Brumpt 1932; Rickettsia megawi var. pijperi Amaral et Monteiro 1932; Rickettsia blanci Caminopetros 1932; Dermacentroxenus rickettsi var. pijperi Mason et Alexander 1939; Dermacentroxenus rickettsi var. conori Mason et Alexander 1939; Dermacentroxenus conorii Steinhaus 1946). (p. 157).

3. Ixodoxenus sibiricus comb. nov. (Krontovskaia, Dermacentroxenus rickettsi var. sibirica; Dermacentroxenus sibiricus Zdrodovskii 1949). Causes an eruptive (exanthematic) typhoid fever in Siberia. (p. 158).

4. Ixodoxenus austrailis nom. nov. (Andrew et al. 1946) (Dermacentroxenus austrailis Z. and K. 1949) (p. 159).

Subgenus 3. Gamasoxenus nom. nov. (Acaroxenus Z. and K. 1949) (p. 159).

1. Gamasoxenus muris nom. nov. (Huebener et al. 1946). (Rickettsia akari Heubner et al. 1946;

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Acaroxenus varioloidis Z. and K. 1949) (p. 159).

Genus 2. Trombidoxenus Z. and K. 1949.

1. Trombidoxenus orientalis Z. and K. 1949 (Hayashi 1920) (Theileria tsutsegamushi Hayashi 1920; Rickettsia orientalis Nagayo et al. 1930; Rickettsia tsutsugamushi Ogata 1931; Rickettsia akamushi Kawamura et Imagawa 1931; Rickettsia orientalis var. schuffneri Amaral et Monteiro 1932; Rickettsia megawi Amaral et Monteiro 1931; Rickettsia megawi var. fletcheri Amaral et Monteiro 1931; Rickettsia tsutsugamushi-orientalis Kawamura et al. 1934; Rickettsia pseudo-typhi ver Woort 1938; Rickettsia sumatranus Kouwenaar et Wolff 1942; Dermacentroxenus orientalis Moshkavshi 1945). (p. 160).

2. Trombidoxenus americanus spec. nov. (Baker, 1946). Causes a disease of rodents in Canada. (p. 162).

Genus 3. Coxiella Philip 1943. (p. 163).

1. Coxiella diaporica comb. nov. (Derrick, 1937). (Rickettsia burneti Derrick 1939; Rickettsia diaporica Cox 1939; Rickettsia diaporica var. americana Anonym. 1941; Rickettsia (Coxiella) burneti Philip 1943; Rickettsia burneti var. caprina Caminopetros 1949). (p. 163)

Genus 4. Wolhynia Z. and K. 1949. (p. 164).

1. Wolhynia quintanae Z. and K. 1949. (Topfer 1916) Rickettsia quintana Schminke 1917; Rickettsia wolhynica Jungment et Kuczwinski 1918; Rickettsia weigli Mosing 1934; Fossilis quintana Megaw 1943) (p. 165)

2. Wolhynia rutchkovskyi Z. and K. 1949. (Rickettsia quintana Rutchkovsky 1945) (p. 165)

Genus 5. Kurlovia nom. nov.

Subgenus 1. Cowdria Moshkovski 1945. (p. 166)

1. Cowdria ruminantium Moshkovski 1945 (Cowdry, 1925). (Rickettsia ruminantium Cowdry 1925; Rickettsia (Cowdria) ruminantium Moshkovski 1945). (p. 166).

2. Cowdria suis comb. nov. (Donation et Gayot, 1942). (Rickettsia suis Donation et Gayot 1942). (p. 167)

Subgenus 2. Ehrlichia subgen. nov. (p. 167)

1. Ehrlichia kurlovi subgen. nov. Moshkovski 1937 (Kurlov 1889). (Erlichia (sic) (Rickettsia) kurlovi Moshkovski 1937). (p. 168).

2. Ehrlichia canis Moshkovski 1937; (Donation et Lestoquard 1937). (Rickettsia canis Donation et Lestoquard 1937; Ehrlichia (Rickettsia) canis Moshkovski 1937). (p. 168)

3. Ehrlichia bovis Moshkovski, 1947. (Donation et Lestoquard 1936). (Rickettsia bovis Donation et Lestoquard 1936). (p. 169)

4. Ehrlichia ovina Moshkovski 1945. (Lestoquard et Donation 1936). (Rickettsia ovina Lestoquard 1936). (p. 169)

Family II. Chlamydozoaceae Moshkovski 1945.

Genus 1. Rickettsiaformis Z. and K. 1949. (p. 175)

Subgenus 1. Rickettsiaformis subgen. nov. (p. 175)

1. Rickettsiaformis psittacosis Z. and K. 1949. (Levinthal, 1930) (Microbacterium multifforme psittaci Levinthal 1930; Rickettsia psittaci Lillie 1930; Ehrlichia (Miyagawanella) psittaci Moshkovski 1945; Miyagawanella psittacii Rake 1948; Chlamydozoon psittaci Ryshkov 1950). (p. 176)

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2. Rickettsiaformis ornithosis Z. and K. 1949 (Meyer, 1941). Miyagawanella ornithosis Rake 1948; Chlamydozoon columbi Rhzhkov 1950). Virus isolated from parrots. (p. 177)
3. Rickettsiaformis pullorum spec. nov. (Nelson, 1936). Causes an infectious cold in chickens and in other birds. (p. 178)
4. Rickettsiaformis columbarum spec. nov. (Hart, 1940). Causes an infectious sinusitis in pigeons. (p. 179)
5. Rickettsiaformis pneumoniae Z. and K. 1949 (Eaton et al., 1941). (Miyagawanella pneumoniae Rake 1948; Chlamydozoon hominis Ryzhkov 1950; (Eaton et al., 1941), (p. 180)
6. Rickettsiaformis pneumomeningitidis spec. nov. (Levi, 1949). Isolated from spinal fluid of a patient sick with meningitis. It is possible that the same virus is the cause of pseudolymphocytic choriomeningitis (Mac Callum et al., 1939; Legio simulans Holmes 1948). Its relationship to R. meningopneumoniae is not clear. (p. 181)
7. Rickettsiaformis muris Z. and K. 1949 (Dochez et al., 1936). (Ehrlichia (Miyagawanella) bronchopneumoniae Moshkovski 1945; Miyagawanella bronchopneumoniae Rake 1938; Chlamydozoon murinus Ryzhkov 1950). (p. 182)
8. Rickettsiaformis meningopneumoniae Z. and K. 1949 (Francis et Magill, 1938). (Chlamydozoon meningophilus Ryzhkov 1950) This appears to be the same virus or a variation of the virus which was isolated from mice. (Eaton et al., 1942) Causes meningopneumonia. (p. 183)
9. Rickettsiaformis rodentium spec. nov. (Nelson, 1937). The cause of infectious catarrh in white mice. (p. 184).

10. Rickettsiaformis rattum spec. nov. (Nelson, 1940). The cause of infectious catarrh in white rats. Its relationship to a pneumonia of wild rats (Nelson, 1949) and a pneumonia of gray rats (Andrewes and Glover, 1949) is not clear. (p. 185).

11. Rickettsiaformis opposum nom. nov. (Roca-Garcia, 1949). (Opposum virus (Roca-Garcia 1949). Chlamydozoon opposumi Ryzhkov 1950). The cause of a sickness in the opossum Family Didelphidae. (p. 185)

12. Rickettsiaformis caviae spec. nov. (Pellisier et al., 1950). Latent virus of guinea pigs. (p. 186)

13. Rickettsiaformis felis Z. and K. 1949 (Baker, 1942). (Miyagawanella felis Rake 1948; Chlamydozoon felis Ryzhkov 1950). (p. 187)

14. Rickettsiaformis bovis nom. nov. (York et Baker, 1951). (Miyagawanella bovis York et Baker 1951). Cause of a systematic infection in calves. (p. 187)

15. Rickettsiaformis ovis spec. nov. (Monsur et Barwell 1951). Cause of an infectious abortion in sheep. (p. 188)

16. Rickettsiaformis lymphogranulomatis Z. and K. 1949. (Hellestrom et Wasseu, 1930). (Miyagawanella lymphogranulomatis Brumpt 1938; Ehrlichia lymphogranulomatis mauro; Ehrlichia (Miyagawanella) lymphogranulomatis Moshkovski 1945; Chlamydozoon lymphophilus Ryzhkov 1950). (p. 188)

Genus 2. Chlamydozoon Halbestädter et Prowazek 1907.

1. Chlamydozoon trachomatis Foley et Parrot 1937. (Halbestädter et Prowazek, 1907). (Rickettsia trachomae Busacca 1939; Rickettsia trachomatis Foley et Parrot 1937). (p. 190)

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2. Chlamydozoon oculogenitale Moshkovski 1945.
(Halbestadter et Prowazek, 1909). (p. 191)

3. Chlamydozoon pecoris Z. and K. 1949 (Coles, 1931) (Rickettsia conjunctivae Coles 1931; Chlamydozoon conjunctivae 1945; Colesiota conjunctivae Rake 1948). (p. 191)

4. Chlamydozoon pullorum Z. and K. 1949 (Coles, 1940). (Rickettsia conjunctivae-galli Coles 1940; Colesiota conjunctivae-galli Rake 1948). (p. 192)

Order II. Strongyloplasmales nom. nov. (p. 194)

Family I. Strongyloplasmaceae Z. and K. 1942 (p.195).

Genus I. Strongyloplasma Lipschütz 1912 (p. 195).

Subgenus I. Strongyloplasma Z. and K. 1949.

1. Strongyloplasma variolae Lipschutz 1912 (Guarnieri, 1892); Borreliota variolae Goodpasture 1933; Paschenia hominis Ryzhkov 1950).

2. Strongyloplasma vaccinae Moshkowski 1945
(Guarnieri, 1892) (Paschenia bovis Ryzhkov 1950).
(p. 198)

3. Strongyloplasma ectromeliae nom. nov. (Marshall, 1930). (Cytoryctes ectromeliae Moshkowski 1945; Scelus marmorans Holmes 1948; Latens ectromeliae Z. and K. 1949; Paschenia murina Ryzhkov 1950). (p. 200)

Subgenus 2. Borreliota Z. and K. 1949. (p.201)

1. Borreliota avium Goodpasture 1933 (Borrel, 1903). (Strongyloplasma avium Lipschütz 1930).
(p. 201)

Subgenus 3. Zoovariola Z. and K. 1949. (p.203)

1. Zoovariola suis nom. nov. (Poenaru, 1913).

(Borreliota suis Holmes 1948). (p. 203)

2. Zoovariola ovis Z. and K. 1949. (Latentis ovis Ryzhkov 1950). Cause of pox in sheep. Differs from S. vaccinia var. ovis. (p. 204)

Subgenus 4. Varicella Z. and K. 1949 (p. 204)

1. Varicella varicellae Z. and K. 1949 (Aragao, 1911). (Strongyloplasma varicellae Moshkowski 1945; Cytoryctes varicellae Ryzhkov 1950; Briareus varicellae Holmes 1848). (p. 204)

2. Varicella zonae Z. and K. 1949 (Paschen, 1933) (Cytoryctes varicellae subsp. zoster Ryzhkov 1950) (p. 205)

Genus 2. Latens Z. and K. 1949. (p. 206)

Subgenus 1. Latens Z. and K. 1949. (p. 206)

1. Latens herpetis Z. and K. 1949 (Grüther, 1912) (Neurocystis herpetii Levanditi et Schoen 1927; Scelus recurrens Holmes 1948; Latentia herpes Ryzhkov 1950). (p. 206)

2. Latens pemphigi spec. nov. (Urbach et Reiss, 1930). (p. 208)

3. Latens dermatitidis spec. nov. (Poincleau, 1924). (p. 208)

4. Latens pseudorabiei nom. nov. (Aujescky, 1902). (Scelus suillum Holmes 1948; Neuroryctes pseudorabiei Z. and K. 1949; Latentia aujescky Ryzhkov 1950). (p. 208)

5. Latens paravaccinia Z. and K. 1949 (Morozov, 1930). (Strongyloplasma paravaccinia Morozov 1940). Cause of an infectious dermatitis in sheep. (p. 209)

6. Latens cuniculi Z. and K. (Sabin and Wright,

1934). (Scelus beta Holmes 1948; Latentia beta Ryzhkov 1950). (p. 210)

Subgenus 2. Ulcerogenes Z. and K. 1949 (p. 211)

1. Ulcerogenes ovium A. and K. 1949 (Aynaud, 1921; Tunnickliff et Matischeck, 1941). (Scelus ulceris Holmes 1948; Latentia ovis Ryzhkov 1950). (p. 211)

2. Ulcerogenes vitulorum Z. and K. 1949 (Mason et Neitz, 1940). (Scelus bovinum Holmes 1948). (p. 212)

3. Ulcerogenes equorum. Z. and K. 1949 (Olitzky, 1927). (Hostis equinus Holmes 1948; Latentia equi Ryzhkov 1950). (p. 212)

Family II. Neuroryctaceae Moshkovski 1945. (p. 217)

Genus I. Neuroryctes Moshkowsky 1945 (p. 218).

1 and 2. Neuroryctes rabiei Z. and K. 1949 (Pasteur, 1880). (Neuroryctes hydrophobiae Calkins 1907; Encephalitozoon rabiei Manouelian et Viala 1924; Glugea lyssae Lovaditi et al. 1928; Formido inexorabilis Holmes 1948; Latentia pasteuriana Ryzhkov 1950). (p. 218)

1. Neuroryctes rabiei communis. (p. 220)

2. Neuroryctes rabiei fixatus. (p. 220)

3. Neuroryctes bovis spec. nov. (Patto, 1932)
Cause pseudorabic disease in cattle. (p. 220)

4. Neuroryctes aegypticum spec. nov. (Carpano, 1929). Cause of rabies in dogs. (p. 221)

Genus 2. Demyelinisator Z. and K. 1949. (p. 221)

1. Demyelinisator hominis Z. and K. 1949. (Solov'ev and Shubladzo, 1942) (Myelinophagus hominis Ryzhkov 1950). Cause of a sharp encephalomyelitis and sclerosis in man. (p. 221)

2. Demyelinisator vulpis Z. and K. 1949 (Green, 1926). (Tapreia vulpis Holmes 1948; Myelinophagus vulpis Ryzhkov 1950. (p. 222)

3. Demyelinisator zibellinae nom. nov. (Solov'ev and Shubladze 1942) (Myelinophagus solovievi Ryzhkov 1950). (p. 223)

4. Demyelinisator sibiricus spec. nov. (Levenberg, 1936). (p. 223)

5. Demyelinisator muris spec. nov. (Cheever et al. 1949). Cause of an encephalomylitis in white mice. (p. 224)

Genus 3. Vyscholesskyella Z. and K. 1949.

1. Vyscholesskyella equina Z. and K. 1949 (Zwick et Seifried 1924). Erro bornensis Holmes 1948; Latentia borna Ryzhkov 1950. (p. 224)

Family III. Tumefaciaceae nom. nov. (p. 226)

Genus 1. Tumefaciens Z. and K. 1949. (p. 227)

1. Tumefaciens verrucarum Z. and K. 1949 (Cuiffo, 1907). Molitor verrucae Holmes 1948; Papillomiferus hominis Ryzhkov 1950; Papilomiferus laryngophilus Ryzhkov 1950). (p. 227)

2. Tumefaciens mollusci Z. and K. 1949 (Lipschütz 1911). (Strongyloplasma hominis Lipschütz 1911; Molitor hominis Holmes 1948). (p. 228)

3. Tumefaciens bovis Z. and K. 1949 (Creech, 1929) (Molitor bovis Holmes 1942; Papillomiferus bovis Ryzhkov 1950). (p. 228)

4. Tumefaciens canis Z. and K. 1949 (DeMonbreun et Goodpasture, 1932). (Molitor buccalis Holmes 1948; Papilomiferus canis Ryzhkov 1950) (p. 229)

5. Tumefaciens fibromyxomatis Z. and K. 1949

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- (Aragão, 1911). (Chamydozoon myxomae Araújo 1911; Strongyloplasma myxomae Araújo 1927; Sanareilla cuniculi Lipschütz 1927; Molitor myxomae Holmes 1948; Tumoriferus myxomae Ryzhkov 1950). (p. 229)
6. Tumefaciens gingivalis Z. and K. 1949. (Parsons et Kidd, 1943). (Molitor gingivalis Holmes 1948). (p. 230)
7. Tumefaciens papillomatis Z. and K. 1949 (Shope 1933). (Molitor sylvilagi Holmes 1948; Papillomiferus leporis Ryzhkov 1950). (p. 231)
8. Tumefaciens lactogenes nom. nov. (Bittner, 1936) (Briareus adeno-carcinomatis murium Morozov 1949; Tumefaciens muris Z. and K. 1949; Tumoriferus lactis Ryzhkov 1950). Cause of a cancer in the mammary gland of mice. (p. 231)
9. Tumefaciens muris Z. and K. (Zilber, 1945) (p. 233).
10. Tumefaciens sarcomatis Z. and K. 1949 (Rous, 1911). (Molitor tumoris Holmes 1948; Tumoriferus avium Ryzhkov 1950). (p. 234)
11. Tumefaciens gallinarum nom. nov. (Ellermann et Bank, 1908). (Trifur gallinarum Holmes 1948; Sanguiphilus gallinarum Z. and K. 1949; Tumoriferus avium subsp. leucosoferus Ryzhkov 1950). Cause of an infectious leukemia in chickens. (p. 235)
12. Tumefaciens ranae Z. and K. 1949 (Lucke, 1934). Cause of tumors in the leopard frog. (p. 236).
13. Tumefaciens batrachorum spec. nov. (Sanfelice, 1913). Cause of a small tumor of the skin in frogs. (p. 236)
14. Tumefaciens prinus Z. and K. 1949 (Keysselitz,

1868). Cause of a smallpox (epithelioma) in carp (Fam. Cyprinidae). (p. 236)

Order III. Gamaleiales ord. nov. (p. 241)

Family I. Pneumophilaceae Z. and K. 1949. (p. 241)

Genus I. Pneumophilus Z. and K. 1949. (p. 242)

1-5. Pneumophilus gripposus Z. and K. 1949 (Smith et al., 1933). (Tapreia alpha Holmes 1948; Tapreia beta Holmes 1948; Pneumotropus grippae Ryzhkov 1950). (p. 243)

1. Pneumophilus gripposus A.
2. Pneumophilus gripposus A₁.
3. Pneumophilus gripposus B.
4. Pneumophilus gripposus C.
5. Pneumophilus suis.

6. Pneumophilus parotitidis nom. nov. (Johnson et Goodpasture, 1934). Rabula inflans Holmes 1948; Glandulophilus parotitidis Z. and K. 1949; Glandulophilus hominis Ryzhkov 1950). Cause of an epidemic parotitis. (p. 245).

7. Pneumophilus pullorum nom. nov. (Doyle, 1927). (Tortor flurens Holmes 1948; Pestigenes newcastlei Z. and K. 1949; Flagellophorus pseudopestis Ryzhkov 1949). Cause of a fatal disease of fowls. (p. 246)

8. Pneumophilus paragripposus spec. nov. (Hirst, 1949). Cause of an acute form of catarrh (influenza) (p. 247)

9. Pneumophilus pneumoniae Z. and K. 1949 (Dochez et al., 1937). (Tarpeia promens Holmes 1948; Pneumotropus incognitus Ryzhkov 1950). (p. 247)

10. Pneumophilus muris spec. nov. (Andrewes, 1945). Cause of a pneumonia (Broncho-pneumonia, infectious catarrh) in mice. It appears to be the same species of virus that was isolated in 1946 (Horsfall and Curnen). (p. 249)

11. Pneumophilus rattum spec. nov. (Nelson, 1948)
Cause of a pneumonia in white rats. (p. 249)

12. Pneumophilus equi nom. nov. (Koliskov and
Rozhnov, 1943). (Pneumopropus equi Ryzhkov 1950)
(p. 249)

Genus 2. Enterophilus Ryzhkov, 1950. (p. 250)

1. Enterophilus vitulorum nom. nov. (Baker, 1942)
(Tarpeia vitulae Holmes 1948; Pneumophilus vitu-
lorum Z. and K. 1949; Pneumotropus bovis Ryzhkov
1950). Cause of an infectious bronchitis in horned
cattle. (p. 250)

2. Enterophilus felis Ryzhkov 1950. (Verge et
Cristopheroni, 1928). (Tarpeia felis Holmes 1948;
Pestigenes felis Z. and K. 1949). Cause of a laryn-
gic enteritis in cats. It appears that this virus is
identical with the virus of cats described by Hindle
et Findlay, 1932. (p. 250)

3. Enterophilus pullorum nom. nov. (Beach et Sei-
fried, 1931). (Tarpeia avium Holmes 1948; Ulcero-
genes pullorum Z. and K. 1949; Pneumotropus avium
Ryzhkov 1950). Cause of a laryngic tracheitis in
birds. (p. 252).

4. Enterophilus murinus spec. nov. (Cheever et al.
1946). Cause of a diarrhoea in suckling mice.
(p. 252)

Family II. Gamaleiaceae fam. nov. (p. 253)

Genus I. Gamaleia nom. nov. (p. 253)

1. Gamaleia bovis nom. nov. (Gamaleia, 1886).
(Tortor bovis Holmes 1948; Pestigenes bovis Z.
and K. 1949). Cause of a plague in horned cattle.
(p. 253)

2. Gamaleia suis nom. nov. (Dorkamp, 1929).
Tortor suis Holmes 1948; Pestigenes suis Z. and K.

1949; Enterophilus porci Ryzhkov 1950). Cause of a bilious disease (cholera) in pigs. (p. 254)

3. Gamaleia viverrae spec. nov. (Glanetz et Smetana, 1937). (Tarpeia viverrae Holmes 1948; Pestigenes viverrae Z. and K. 1949). Cause of a ferret distemper. (p. 255)

4. Gamaleia caviae spec. nov. (Gasperi et Sangiorgi 1916). Cause of a distemper in guinea pigs. This is apparently identical with the virus described by Petri and O'Brien, 1910. (p. 255).

5. Gamaleia pullorum nom. nov. (Centanni, 1901). (Tortor galli Holmes 1948; Pestigenes pullorum Z. and K. 1949; Pantropus avium Ryzhkov 1950). Cause of an infectious disease in birds. (p. 255)

6. Gamaleia aegypticum nom. nov. (Lagrange, 1929). (Pestigenes aegypticum Z. and K. 1949). Cause of a pneumonia in birds in Egypt. (p. 256)

Genus 2. Polynosa gen. nov. (p. 257)

1. Polynosa morbillorum nom. nov. (Anderson et Goldberg, 1911). (Briareus morbillorum Holmes 1948; Maculigenes morbillorum Z. and K. 1949; Rubeoleferus morbillorum Ryzhkov 1950). Cause of measles (Rubeola) in man and monkeys. (p. 257)

2. Polynosa canis nom. nov. (Carro, 1904). (Tarpeia canis Holmes 1948; Pestigenes canis Z. and K. 1949; Enterophilus canis Ryzhkov 1950; Cause of a disease in dogs. (canine distemper) (p. 258)

3. Polynosa latens spec. nov. Cause of a polio-like disease in man. (p. 259)

Family III. Botkiniaceae Ryzhkov 1950. (p. 264)

Genus I. Botkinia Ryzhkov 1950. (p. 264)

1. Botkinia hominis nom. nov. (Hepatophilus hominis Z. and K. 1949; Botkina hepatica Ryzhkov 1950). Cause of an epidemic hepatitis in man. (p. 265)
2. Botkinis suilla nom. nov. (Anderson, 1937). (Hepatophilus suillus Z. and K. 1949). Cause of a hepatitis in pigs. (p. 266)
3. Botkinis muris nom. nov. (Chodukin et al. 1949). (Hepatophilus muris Z. and K. 1949). Cause of a hepatitis in mice. (p. 266)
4. Botkinia equi nom. nov. (Dimock et Edwards, 1936). Tortor equae Holmes 1948). Cause of an abortion in mares (p. 267)
5. Botkinia canis spec. nov. (Rubarth, 1947). Cause of a hepatitis in dogs. (p. 267)

Genus 2. Glandulophilus Z. and K. 1949. (p.267)

1. Glandulophilus caviae nom. nov. (Jackson, 1920) (Rabula levis Holmes 1948; Glandulophilus rodentium Ryzhkov 1950). This is a virus from the salivary glands of guinea pigs. (p. 267)
2. Glandulophilus rattum nom. nov. (Thompson, 1932). Rabula exigus Holmes 1948). This is a virus from the salivary glands of rats. (p. 268)
3. Glandulophilus murium nom. nov. (Kuttner et Wang, 1934). (Rabula latens Holmes 1948). This is a virus from the salivary glands of mice. (p.268)
4. Glandulophilus cricetuli nom. nov. (Kuttner et Wang, 1934). (Rabula innocuus Holmes 1948). This is a virus of the salivary glands of the Chinese hamster (Genus - Cricetus). (p. 269)
5. Glandulophilus simii spec. nov. (Cowdry et Scott, 1935). Virus of the salivary glands of monkeys. (p. 269)

6. Glandulophilus hominis spec. nov. (Zhdanov et al., 1949). Causes an inflammation of human salivary glands. (p. 269)

Order IV. Arthropodophiliales ord. nov. (p. 273)

Family I. Acarophilaceae fam. nov. (p. 274)

Genus 1. Encephalophilus Z. and K. 1949. (p. 274)

1. Encephalophilus silvestris nom. nov. (Zilber, 1937). (Erro silvestris Holmes 1948; Encephalotropus silveri Ryzhkov 1950). Cause of a tick-borne, spring-summer encephalitis. (p. 275)

2. Encephalophilus occidentalis spec. nov. (Zilber, 1945). Cause of a tick-borne encephalitis in West Europe. (p. 276)

3. Encephalophilus scotticus Z. and K. 1949 (Mackie, 1931). (Erro scotticus Holmes 1948; Encephalotropus ovis Ryzhkov 1950). (p. 276)

4. Encephalophilus australis nom. nov. (Cleland et Campbell, 1919). (Erro incognitus Holmes 1949; Encephalotropus australiensis Ryzhkov 1950). Cause of an Australian encephalitis (X-disease). (p. 277)

5. Encephalophilus murinus spec. nov. (Zhdanov et Levi, 1949). Cause of a spontaneous encephalomyelitis in mice. (p. 277)

6. Encephalophilus intermedius spec. nov. (Levi, 1950). Cause of a spontaneous encephalomyelitis in mice. (p. 278)

Genus 2. Meningophilus Ryzhkov 1950. (p. 279)

1. Meningophilus choriomeningitidis nom. nov. (Armstrong et Lillie, 1934). (Legio erebea Holmes 1948; Neurophilus chorimeningitidis Z. and K. 1949; Meningophilus muris Ryzhkov 1950). Cause of a

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lymphocytic choriomeningitis. This virus was isolated and described by Bingle, 1951. (p. 279)

Genus 3. Haemorrhagogenes Z. and K. 1949.
(p. 281)

1. Haemorrhagogenes tchumakovi nom. nov. (Tchumakov et al, 1944). (Pantrophus tchumakovi Ryzhkov 1950). Cause of a hemorrhoidal fever in southern U.S.S.R. (p. 282)

2. Haemorrhagogenes sibiricus Z. and K. 1949 (Tchumakov et al., 1947). (Pantropus tchumakovi subspec. dermacentori Tyzhkov 1950). Causes tick-borne fever in Siberia. (p. 282)

3. Haemorrhagogenes orientalis Z. and K. 1949. (Smorodincev et al., 1949). Causes a tick-borne fever in Manchuria (p. 283).

4. Haemorrhagogenes nephritidis Z. and K. 1949 (Smorodincev et al., 1949). Causes an infectious nephritis. (p. 283)

5. Haemorrhagogenes suis nom. nov. (Durand et al., 1936). (Legio suariorum Holmes 1948). Causes a disease in young pigs in Switzerland. (p. 284)

Family II. Insectophilaceae fam. nov. (p. 285)

Genus 1. Insectophilus gen. nov. (p. 285)

Subgenus 1. Neurophilus sub. gen. nov. (p. 286)

1. Neurophilus japonicus nom. nov. (Hayeshi, 1933) (Erro japonicus Holmes 1948; Encephalophilus japonicus Z. and K. 1949; Encephalotropus japonicus Ryzhkov 1950). Cause of an encephalitis in horses in Japan. (p. 286)

2. Neurophilus americanus nom. nov. (Muckenfuss et al., 1933). (Erro scelestus Holmes 1948; Ence-

phalophilus americanus Z. and K. 1949; Encephalotropus St. Lui Ryzhkov 1950). Cause of an American encephalitis (St. Louis). (p. 267)

3. Neurophilus nili nom. nov. (Smithburn et al., 1940). (Erro nili Holmes 1948; Encephalophilus nili Z. and K. 1949; Encephalotropus nilensis Ryzhkov 1950). Cause of an encephalitis in West Nile Region. (p. 288)

4. Neurophilus ilheus spec. nov. Virus isolated from mosquito, Aedes psorophora et Ilheus. Brazil. Causes inflammation of brain in white mice. (p. 289)

5. Neurophilus conjunctivitis spec. nov. (Sanders 1942). (Chlamydozoon kerato-conjunctivae Ryzhkov 1950). Cause of a kerato-conjunctivitis in man and some species of animals. (p. 289)

Subgenus 2. Viscerophilus subgen. nov.

1. Viscerophilus tropicus Z. and K. 1949 (Reed et Carrol 1901). (Charon evagatus Holmes 1948; Pantropus flavus Ryzhkov 1950).

2. Viscerophilus dengue Z. and K. 1949 (Ashburn et Craig, 1907). (Pantropus dengue Ryzhkov 1950). Cause of dengue fever (in warm climates). Vector is a mosquito, Aedes aegypti. (p. 292)

3. Viscerophilus bwamba Z. and K. 1949 (Smithburn et al., 1941). Cause of a fever (bwamba) in mice and monkeys. (p. 293)

Genus 2. Febrigenes gen. nov. (p. 293)

1. Febrigenes pappatasii nom. nov. (Doerr et al., 1908). (Viscerophilus pappatasii Z. and K. 1949; Pantropus pappatasii Ryzhkov 1950). Cause of a disease known as pappatasia fever in tropical and subtropical regions. Vectors are insects, Phlebotomus pappatasii and Phlebotomus caucasicus. (p. 293)

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2. Febrigenes africanus nom. nov. (Daubney et al., 1931) (Charon vallis Holmes 1948; Viscerophilus africanus Z. and K. 1949; Pantropus ovies Ryzhkov 1950.) Cause of an infectious hepatitis. (p. 294)
3. Febrigenes semliki nom. nov. (Smithburn et Haddow, 1944). (Viscerophilus semliki Z. and K. 1949). Cause of an intestinal disease in wild monkeys (Cercopithecus nictitans), sometimes in man. Vector is a mosquito, Aedes abnormalis. (p. 295)
4. Febrigenes bunyamwera spec. nov. (Smithburn et al., 1946). Virus was observed in Bumyamwera (place in region of Uganda). Details are not known. It can be assumed that the infected animals may be wild monkeys. Vectors are mosquitos from which virus was isolated. (p. 295)
5. Febrigenes anophelinus spec. nov. (Roca-Garcia, 1944). Isolated from mosquitos (Anopheles boliviensis). Physical properties like F. bunyamwera, immunologically different. (p. 296)
6. Febrigenes brasiliensis spec. nov. (Roca-Garcia, 1944). (Anopheles B. virus Roca-Garcia, 1944). Isolated from mosquitos Anopheles boliviensis. Typical properties like F. anophelinus, immunologically different. (p. 296)
7. Febrigenes heterogenes spec. nov. (Hughes et Porlowagora, 1950). Virus isolated from mosquitos sick from yellow fever. Immunologically different from above-mentioned viruses. (p. 296)
8. Febrigenes equi nom. nov. (Alexander et Toit, 1934). (Tortor equorum Holmes 1948; Pantropus equi Ryzhkov 1950). Cause of an African plague of horses. (p. 296)
9. Febrigenes ovis nom. nov. (Becker et al., 1934) (Tortor ovis Holmes 1948). Cause of fever in sheep (blue tongue). (p. 297)

Family III. Polyvectaceae fam. nov. (p. 299)

Genus 1. Polyvectus gen. nov. (p. 299)

1. Polyvectus occidentalis nom. nov. (Meyer et al., 1931). (Erro equinus Holmes 1948; Encephalopilus equinus Z. and K. 1949; Neurotropus americanus Ryzhkov 1950). Cause of an encephalomyelitis in horses in Western North America. (p. 299)

2. Polyvectus orientalis spec. nov. (Ten Broek et Merrill, 1933). Cause of an encephalomyelitis in horses in Eastern North America. (p. 301)

3. Polyvectus venezuelensis spec. nov. (Casals et al., 1943). Cause of an encephalomyelitis in Venezuela. (p. 302)

4. Polyvectus colorado nom. nov. (Becker, 1930). (Viscerophilus colorado Z. and K. 1949). Cause of a tick fever in Colorado. (p. 302)

5. Protovirales ord. nov. (p. 303).

1. Neuromyophilaceae fam. nov. (p. 303)

1. Myelophilus gen. nov. (p. 304)

1. Myelophilus hominis nom. nov. (Landsteiner, 1908). (Legio debilitans Holmes 1948; Neurophilus poliomyelitidis Z. and K. 1949; Virothrix hominis Ryzhkov 1950). Cause of poliomyelitis in man. (p. 304)

2. Cerebrophilus gen. nov. (p. 307)

1. Cerebrophilus muris nom. nov. (Theiler, 1935). (Legio muris Holmes 1948; Neurophilus muris Z. and K. 1949; Virothrix theileri Ryzhkov 1950). Causes poliomyelitis in mice. (p. 307)

2. Cerebrophilus caviae (Römer, 1901). (Neurophilus caviae Z. and K. 1949). Cause of a para-

lysis (pseudopoliomyelitis) in guinea pigs. (p. 308)

3. Cerebrophilus suis spec. nov. (Gard, 1943)
(p. 308)

4. Cerebrophilus gallinarum nom. nov. (Jones, 1932)
(Legio gallinae Holmes 1948; Neurophilus gallinarum
Z. and K. 1949; Myelinophagus avium Ryzhkov 1950)
(p. 308)

Genus 3. Cardiophilus gen. nov.

1. Cardiophilus mengo nom. nov. (Dick et al., 1948)
(Neurophilus mengo Z. and K. 1948; Virothrix car-
diophilus subsp. mengo Ryzhkov 1950). Cause of
encephalitis mengo (Mengo - name of place in the
Uganda region). Isolated from sick people and
animals. Source of virus - monkeys. Vectors,
mosquitos. (p. 309)

2. Cardiophilus urbanus spec. nov. (Jungeblut et
Sanders, 1940). (p. 310)

Genus 4. Myophilus gen. nov. (p. 310)

1. Myophilus hominis spec. nov. (Dalldorf et Sick-
les, 1948). Coxsackie virus. (p. 310)

Family II. Sanguiphilaceae fam. nov. (p. 312)

Genus 1. Sanguiphilus Z. and K. 1949. (p. 312)

1. Sanguiphilus equinus Z. and K. 1949. (Vallee et
Carre, 1904). (Trifur equirum Holmes 1948; Hae-
motophilus anemiae Ryzhkov 1950). Causes infec-
tious anemia in horses. (p. 312)

2. Sanguiphilus ovis Z. and K. 1949 (Donation et
Lestoquard, 1924). Causes pernicious anemia in
sheep and goats. (p. 313)

3. Sanguiphilus canis Z. and K. 1949. (Trincas,
1906). Causes contagious anemia in puppies. (p. 313)

4. Sanguiphilus felis Z. and K. 1949. (Lawrence et Syverton, 1938). (Tortor felis Holmes 1948; Haemaphysilus felis Ryzhkov 1950). Causes infectious enteritis in cats. (p. 313)

Family III. Dermaphilaceae fam. nov. (p. 314)

Genus 1. Dermaphilus nom. nov. (p. 314)

Dermaphilus pecoris nom. nov. (Löffler et Frosch, 1897). (Hostis pecoris Holmes 1948; Microvirus pecoris Z. and K. 1949; Löffleria equi Ryzhkov 1950). Causes foot and mouth disease in cattle and other animals including man. (p. 314)

1. Dermaphilus pecoris fancus. (D. fancus). Type J of French authors. Type A, German authors.
2. Dermaphilus pecoris fancus. (D. germanicus). Type A, French authors, Type B, German authors.
3. Dermaphilus pecoris tertius (D. tertius). Type C, German author.

Order VI. Polyedralea ord. nov. (p. 316)

Family I. Polyedraceae fam. nov. (p. 316)

Genus 1. Polyedra nom. nov. (p. 316)

1. Polyedra bombycis nom. nov. (Cohn, 1872). Micrococcus bombycis Cohn 1872; Microsporidium polyedricum Bolle 1894; Micrococcus lardarius 1896; Chlamydozoon bombycis Prowazek 1907; Crystalloplasma polyedricum Prell 1918; Borrelina bombycis Paillot 1926). Cause of anicterus in mulberry silk worm (Bombyx mori) (p. 316)

2. Polyedra lymantriae nom. nov. (Hoffman, 1891) (Bacillus B. Hoffman 1891; Bacterium monachae Tabeuf 1892; Bacillus monachae Eckstein 1894; Crystalloplasma monachae Prell 1926; Borrelina efficiens Holmes 1948). Cause of a wilt disease in

Lymatria monacha (Species of butterfly or its other metamorphic stages). (p. 317)

3. Polyedra porthetriae nom. nov. (Glaser et Chapman, 1913). (Borrelina reprimens Holmes 1948). Cause of a wilt disease in silk worms (Porthetria dispar). (p. 317)

4. Polyedra prodeniae nom. nov. (Steinhaus, 1949) (Borrelina olethria Steinhaus 1949). Causes disease in Prodenia praefica (Butterfly or its other metamorphic stages.) (p. 318)

5. Polyedra coliatidis nom. nov. (Steinhaus, 1948). (Borrelina campeoles Steinhaus, 1949). Cause of a wilt in Colias philodide eurytheme (butterfly). (p. 318).

6. Polyedra phrygonidiae nom. nov. (Chapman et Glaser, 1915). (Borrelina peremptor Steinhaus 1949). Cause of a disease in Phrygonidia californica. (p. 318)

7. Polyedra euxoae spec. nov. (Paillot, 1936). Cause of a poleic disease in Euxoa segetum. (p. 319)

8. Polyedra venessae spec. nov. (Paillot 1936). Cause of a poleic disease in a butterfly (Venessa utricae). (p. 319)

Genus 2. Capsulatus nom. nov. (p. 320)

1. Capsulatus cacoeciae nom. nov. (Bergold, 1948). (Bergoldia calypta Steinhaus 1949). Cause of a granulosa disease in a butterfly. (Cacoecia murinana). (p. 320)

2. Capsulatus peridromae nom. nov. (Steinhaus, 1947). (Bergoldia daboia Steinhaus 1949). Cause of a granulosa disease in a butterfly. (Peridroma margaritosa). (p. 320)

3. Capsulatus junoniae nom. nov. (Steinhaus, 1949).

(Bergoldia lathetica Steinhaus 1949). Cause of a granulosa disease in a butterfly (Junonia coenia) (p. 320)

4. Capsulatus estigmene nom. nov. (Steinhaus, 1949). (Bergoldia thompsonia Steinhaus 1949). Cause of a granulosa disease in an insect (Estigmene acraea). (p. 321)

5. Capsulatus pieris nom. nov. (Paillot, 1926). (Borrelina pieris Paillot 1926; Bergoldia brassicae Steinhaus 1949). Cause of a granulosa disease in an insect (Estigmene pieris). (p. 321)

6. Capsulatus euxoae spec. nov. (Paillot, 1936). Cause of a disease in an insect (Euxoa segetum). (p. 321)

7. Capsulatus pailloti spec. nov. (Paillot, 1936). Cause of a disease in an insect (Euxoa segetum). (p. 321)

Genus 3. Plasmophila nom. nov. (p. 322)

1. Plasmophila pieris nom. nov. (Paillot, 1926). (Borrelina brassicae Paillot 1926); (Paillotella pieris Steinhaus 1949). (p. 322)

Genus 4. Apioles nom. nov. (p. 322)

1. Apioles apis nom. nov. (White, 1913). (Morator aetatulae Holmes 1948). (p. 322)

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