cal survey published so far. All the photographs included in the book have been taken by the author himself.

The reader can get some idea about the extent of the study from the titles of the 13 chapters – Introduction; Geography, climate, ancient authors, and modern visitors; Pre-Roman infrastructure in the Eastern Desert; Ptolemaic diplomatic, military, commercial activities; Ptolemaic and early Roman Berenike and environs; Inhabitants of Berenike in Roman times; Water in the desert and the ports; Nile-Red Sea roads; Other emporia; Merchant ships; Commercial networks and trade costs; Trade in Roman Berenike and lastly, Late Roman Berenike and its demise.

Sidebotham was greatly helped in preparing this monograph by the detailed accounts of numerous Roman and Greek authors covering almost the entire lifespan of the Berenike emporium. The most prominent among them are well known: Agartharchides (2nd century BCE), *On the Erythrean Sea* (ca. 113 BCE); Strabo (64/63 BC – ca. 24 CE), *Geography* (in later 2nd century BCE – early 1st century CE), Pliny, the Elder (23–79 CE); *Natural History* (77–79 CE); Seneca (4 BCE – 65 CE); *Natural Questions* (ca. 60 CE); Claudius Ptolemy (90–168 CE); *Geography* (in mid-2nd century CE), a nameless author in Greek, *Periplus Maris Erythracei* in 40–70 CE; the anonymously prepared maps and itineraries in Roman times, called *Peutinger Table* (5th century CE), and *Ravenna Cosmography* (ca. 700 CE).

Documentation of the Roman period has been so extensive that Sidebotham was able to prepare almost half of his book solely on the basis of these sources. For the second part, the author was able to obtain substantial information on the lives and activities of the people from the large numbers of ostraca (potsherds in which messages/figures are etched) and numerous graffiti obtained during the excavations.

Because of extreme logistical problems of the excavation site – hyperarid conditions, nonavailability of potable water, mainline electricity, telecommunication facilities, etc. the team could survey only about 2% of the surface of the site, and up to 4 m depth covering the late 1st century BCE, 'leaving about 250 years worth of site history'. In spite of these handicaps and hardships, the author has prepared a complete account in unprecedented and intimate detail on the rise and fall of this emporium, and on the lives and work of the population.

The author has estimated that the core of the emporium was only about 1 sq. km in area. Outside of this were the temples, industrial areas, storage structures and the port. There is also evidence that consequent on the silting of the harbour and the recession of the sea, its location (wharf, sea wall, pier, etc.) had to be moved further down. The author has estimated that the core population in Berenike was only about 1000 people. This did not include the substantial floating population of the emporium consisting of tradesmen, middlemen and agents, ship crew, and ship-repairing teams, etc. There is also evidence of Arab and Indian people, particularly from South India, living in Berenike for extended periods of time lasting several months. This is supported by the recovery of a graffiti containing Tamil Brahmi inscriptions, coconut shell and husk, rice and so on. Incidentally, one of the two urns found buried in the floor of the Serapis temple contained as much as 7.55 kg of black pepper. There is also evidence of the widespread and daily use of black pepper by the local people for a variety of purposes, in addition to its use as a food flavouring – in medicine, as offering to the gods, fumigation in temple rites, and so on.

This is a landmark contribution on Roman history. It gives a complete account on the lives and work of people at the dawn of history who were literally living on the edge, and a township that existed in hyperarid conditions and far removed from other human habitations.

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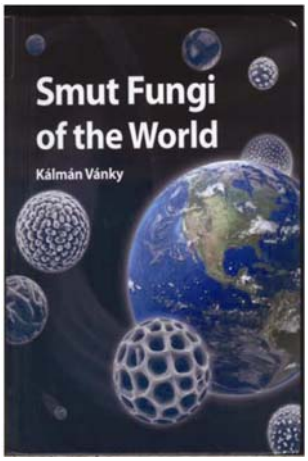


Smut Fungi of the World. Kálmán Vánky. APS Press, 3340, Pilot Knob Road, St Paul, MN 55121, USA. 2012. xvii + 1458 pp. Price: US$ 499.

This monograph by Kalman Vanky is a culmination of more than 50 years of dedicated work and passion for smut fungi. The author, who started studying smut fungi as an amateur while practising medicine, is now a world authority on the subject. He is currently the director of the richest and most comprehensive smut herbarium in the world – Herbarium Ustilaginales Vanky (HUV). He has written articles and books[1–7] and has travelled to more than 50 countries covering all five continents collecting smut fungi, checking type collections in herbaria and personal collections. The present monograph comes almost 60 years after Zundel's work[8], which appeared in 1953.

The book includes 1688 species within 93 genera distributed in 93 families of host plants, of which 90 are on angiosperms, two on Pteridophytes (*Exoteliospora* on *Osmunda*: Osmundaceae and *Melaniella* on *Selaginella:* Selaginellaceae) and one on gymnosperm (*Uleiella* on *Araucaria*: Araucariaceae). Many changes have been made in the classification of smut fungi and allied genera. For example, now there are eight orders and 26 families, in eight subclasses and four classes (three Entorrhizomycetes, Exobasidiomycetes and Ustilaginomycetes in Ustilaginomycotina, and Microbotryomycetes in Pucciniomycotina), from one order and two families identified by Tulasne and Tulasne[9]. With this classification a unique group of fungi is formed, that are plant pathogens mostly affecting the inflorescence and whose

members are classified in two different sub-phyla. A key to the genera has been given according to the host families attacked followed by the description of the species under each genus arranged alphabetically in the entire text. For each genus its synonym, precise generic description and type species have been mentioned.

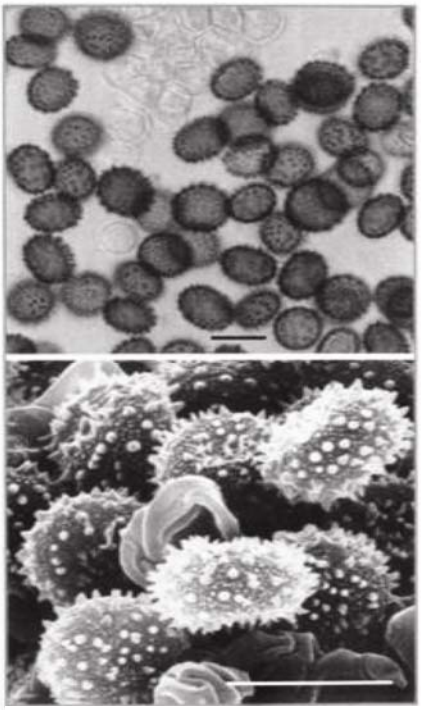
The author has reinstated and revised old taxa/genera as well as redrafted concepts delimiting the generic limits. Over 220 publications reporting new taxa and revisions made by the author have laid the foundation for the present world monograph. His parameters in delimiting taxa include host genera and taxonomy of the host family, which form the major identification basis of smut fungi. Some smuts are restricted to one genus of host family, while others attack only families of monocots or dicots. Also, there are polyphagous smuts which attack families of both monocots and dicots. The symptoms on host, and parts attacked such as roots, stems, leaves, flowers and anthers only, their systemic/local infection, host–parasitic interaction, presence or absence of septal pore and structure, morphology of sorus presence or absence of peridium and columella, spore pattern: singly or in balls/aggregation pattern, presence or absence of sterile cells, their colour and shape, septation of one type or two, shape and ornamentation as evidenced by SEM and TEM, their formation pattern, spore germination if data have been obtained, pattern: phragmobasidium/holobasidium or irregular pattern/germination not known and sporidia morphology are some of the characters used in delimiting/defining the generic limits. The author's many years of experience has enabled refining the generic limits and circumscription of each genus or species. The species within each genus is described with hosts attacked and country of occurrence. A key to the species is also given under each genus wherever two or more species are known. In case of large genera with several species, emphasis is on host plant taxonomy: family/genus and then spore morphology associated characters.

The book is profusely illustrated with 2800 LM and SEM photomicrographs. The author has included LM photomicrographs for spore shape, aggregation/singly and SEM figures of ornamentation – a key feature in smut fungi/species delimitation. The author is a gifted artist, which is reflected in his 650 line drawings of symptoms on the host plants attacked.

Out of 93 genera, 31 are monotypic, while some are enormous like *Sporisorium* (321 spp.), *Tilletia* (174), *Urocystis* (162), *Ustilago* (162), *Entyloma* (161), *Microbotryum* (86), *Anthracoidea* (89) and *Thecaphora* (60), among others. Similarly, host genera in the family Cyperaceae and Poaceae are attacked by 25 and 19 smut genera respectively. It is also revealed that host genera like *Andropogon*, *Carex*, *Panicum*, *Polygonum* and *Rhynchospora* are large reservoirs of smut fungi, as many of the smut species attack these plants. The main part of the species description ends at p. 1651. An addendum comprising 37 new species either published or submitted for publication is a useful addition. It was included while the monograph was still in the press, and hence updated. The author has also listed reference data of 202 species under 'doubtful, excluded or invalidly published taxa'. An exhaustive 65-page selective literature is also given. There are two indexes at the end – one on hosts and their attacking species, and the second is an epithet list of smut fungi with their genus.

With the publication of this authoritative work, plant pathologists may have to rename pathogens for many crops due to new concepts. For example, leaf smut of rice *Entyloma oryzae* will be now *Eballistra oryzae*, in a new genus; the smut of pearl millet *Tolyposporium penicillariae* will be *Moesziomyces bullatus*, and the angular leaf spot of blackgram long considered as an ascomycete will be now in a newly erected genus *Erratomyces* as *E. patelii*. The well-known four smuts on sorghum, long considered in *Sphacelotheca*/*Tolyposporium* (grain smut: *S. sorghi*, head smut: *S. reilianum*, loose smut: *S. cruenta* and long smut: *T. ehrenberghii*) are now treated as species of *Sporisorium*. Similarly, plant conservationists will have to look for protection of fungi associated with threatened plants, as 25% of the smut fungi are collected once as mentioned by the author and any threat to plants/habitat means a threat to the smut fungi associated with them. The author has cited an example of the genus *Mundkurella*. The host of the type species is *Heptapleurum venulosum* collected from Lal Bagh, Bangalore. This is known only from the type collection. Unfortunately, the infected tree in the park, from which the collection was done, was felled (M. S. Patil, pers. commun.). The rising habitat destruction imposes threat to the undocumented or undiscovered taxa. Conservation of threatened plants means conservation of smut fungi associated with them. Much

Macalpinomyces eragrostiellae on *Eragrostiella bifaria.*



Macalpinomyces viridans on *Sporobolus actinocladus.*

attention is needed in this direction about which the author has expressed great concern in his concluding part of the introduction and elsewhere.

The monograph will be useful to mycologists, plant pathologists, ecologists, molecular biologists and plant conservationists, and will remain an essential ready reference for researchers in the field of smut fungi.

As a member of the mycological fraternity, I thank Kalman Vanky for this contribution which will be helpful for scholars, teachers, students and those who are passionate about smut fungi and congratulate the author for the timely, long-awaited monumental work.

The American Phytopathological Society (APS) Press also deserves credit for quality plate composition, flawless and superb production.

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Annual Review of Cell and Developmental Biology, 2011. Randy Schekman, Larry Goldstein and Ruth Lehman (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 27. xiii + 816 pp. Price not mentioned.

The book under review is a comprehensive compilation of pioneering and critical reviews on a number of specialized topics in the area of cell and developmental biology. There are 30 chapters, including one contributed by Martin Raff, an eminent immunologist and neurobiologist, giving a detailed account of his scientific pursuit and revealing once again his versatile scientific contribution in the area of cell and developmental biology. The authors of each chapter have, in general focused on path-breaking discoveries, and have also discussed the controversies in the respective fields. They have also organized the text in a lucid format, incorporating separate sections on summary and future issues/ implications at the end of the review, which will help the readers gain a clear and deep insight into the respective topic.

The common theme of the book is cellular dynamics and development. It exhaustively discusses intracellular trafficking, signalling and intercellular interaction and development.

The chapter titled 'Membrane protein insertion at the endoplasmic reticulum' deals with the energetics of membrane protein insertion and the influence of distant sequence elements on membrane protein topology, in addition to the basic topology of membrane proteins. The review also discusses the challenges and limitations of membrane topology prediction methods and critically analyses the challenges in understanding co-translational and post-translational protein insertion.

The basic conceptual framework of the book is to understand cellular physiology in relation to the energetic constraints of a system. For instance, the Golgi complex is one of the most studied organelles of the cell. Innumerable studies and references talk about its principal functions and its peculiar shape. However, there are only a handful of studies which actually throw light on the mechanism by which its size is controlled. The chapter titled 'Control of organelle size: the Golgi complex' discusses specific examples which explain the process of change in size of the Golgi complex. The study also discretely highlights that the altered cargo load leads to feedback inhibition of transcription of Golgi complex enzymes.

One of the principal discoverers of membrane trafficking and fission is S. L. Schmid. The book has incorporated a recent review from his research group. The review 'Dynamin: functional design of a membrane fission catalyst' not only incorporates the initial discoveries in the field, but also highlights the most recent developments. The authors have commented on the energetics of tubule formation by dynamin self-assembly and also on the metastable state of the membrane on a much shorter timescale. However, they have not incorporated the role of dynamin inhibitors like dynasore and their role in diseases like epilepsy. Autophagy has gained the attention of researchers throughout the globe due to its role in various diseases. From an elaborate discussion on the endoplasmic reticulum, Golgi and membrane fission, the book subsequently moves on to autophagosomes and 'The role of Atg proteins in autophagosome formation' (chapter 4).

Schematic diagrams of unconventional myosin and descriptions of classical experiments draw a picturesque introduction to the subject (chapter 5). Subsequently, the next chapter 'Force generation, transmission, and integration during cell and tissue morphogenesis' describes load-dependent kinetics of myosin II and the difference in its behaviour under forward and reverse tension. The actin network has been described to behave like a viscoelastic solid under applied force. This phenomenon explicitly explains how a cell ruptures when actin exceeds its elastic limit.

The review on transmembrane collagen receptors discusses the evolutionary significance of collagen and its receptors (chapter 10). Interestingly, Wang *et al.* (2006) have shown that DDRs suppress cell migration in MDCK cell line, whereas many other studies have shown that DDRs induce cell migration in other cell lines. The review has explicitly discussed the role of DDRs in disease progression, as in atherosclerosis. The future implication of $\alpha 2\beta 1$ and glycoprotein VI as drug targets for antiplatelet therapy have also been discussed.

After an intricate discussion on statics and dynamics of a single cell, the book moves on to the details of interaction of