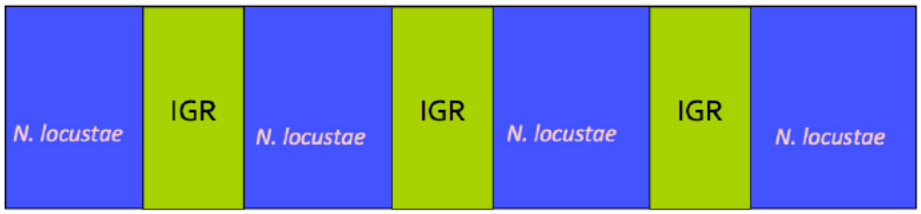

Figure 2. Treatments using *N. locustae* and IGRs. At high densities of locusts (>5 individuals/m^2) or grasshoppers (>15 individuals/m^2), *N. locustae* and IGRs are used in alternate strips.

locustae and the fungus *Metarhizium acridum* and was responsible for setting up the mass production system for *P. locustae*. With *P. locustae*, higher mortalities are obtained than in the past (in the order of 80%) due to the use of new local strains that are more virulent to locusts and grasshoppers and to the development of new water-based formulations. Studies have been conducted on the various ways of using biopesticides, including the use of mixtures of *P. locustae* and *M. acridum*, and using Insect Growth Regulators (IGR) in narrow strips with *P. locustae* in-between in a modification of the RAATs system used in the U.S.A. (Fig. 2). Strong advocacy of the use of biopesticides by Dr. Zhang and his group has led to their widespread application, such that they are used to treat more than 100,000 ha of locust and grasshopper infestations per year in China. This is more than the amount of bio pesticides used against acridids in all of the rest of the world combined—a world-leading achievement.

But, of course, actual treatments are just the final step in the integrated pest management of locust and grasshopper pests. The first step is to know the location of the densest infestations, so that they can be treated in a timely manner. It is critically important that officers involved with locusts and grasshoppers are trained in the most up-to-date methods of survey, including the use of GPS to locate sites with locusts and the use of Differential GPS (DGPS) by aircraft to accurately delineate the precise location of areas treated. Survey and control data are integrated into a national computer-based Geographic Information System (GIS), so that the densest infestations are identified and then treated in a timely, efficient manner. Through this GIS, one of the largest locust and grasshopper workforces in the world (involving more than 2,000 technicians at 127 locust and grasshopper control stations) are organized well and are able to provide China with a highly efficient, intelligent, and precise system for the preventive management of these pests.

Dr. Zhang and those that work with him have taken methods and technologies used elsewhere for locust and grasshopper management and added a number of innovations such that, major swarm invasions of crops by swarms of locusts are rare in China—a substantial achievement that is matched in few other places in the world. Continuing work by the many researchers on locusts and grasshoppers in China will continue this innovation and increase the effectiveness of treatment programs against these pests.

The lost birthday: Archival research reveals the true date of birth of Sir Boris Uvarov, K. C. M. G., F. R. S.[1]

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Not unlike their fellow scientists, historians of science are familiar with the joy of an empirical discovery. Time and again, a stubborn document found in an archive, or an over-sophisticated, apparently-prochronistic clockwork mechanism discovered underwater, or an ancient coin found in an archaeological site challenge established generalisations and force scholars to renegotiate what should be accepted as a matter of fact. Discoveries of this sort are even more surprising when they concern recent events, which are supposed to be better known than the obscure dealings of the ancient world.

Sir Boris Uvarov's name rings a

[1] K. C. M. G. stands for the Knight-Commander of The Most Distinguished Order of Saint Michael and Saint George, F. R. S. for the Fellow of the Royal Society

Figure 1. Boris Uvarov's University Transcript title page. Handwritten remarks reveal his immatriculation as an external student in 1906 and change of his status to that of a student in 1907. Archival reference: Central State Historical Archive in St. Petersburg (Tsentralnyi Gosudarstvennyi Istoricheskii Arkhiv), Fond 14 (St. Petersburg University), Opis' 3, Delo 50126. List. 16 – 17.

bell for every orthopterist and he needs no special introduction in the Orthopterists' Society newsletter. An outline of his biography based on the posthumous reports of his associates is well-known. However, already the very first publications disagreed over a seemingly minor, but actually important detail, his date of birth. While in the obituary published by the Anti-locust Research Centre, it was indicated as November 5, 1888 (Anti-Locust Research Centre 1970), Sir Vincent Wigglesworth, in his obituary note published in the *Biographical Memoirs of the Fellows of the Royal Society*, used November 5, 1889, commenting:

"In the passport issued to Uvarov by the Government of the Republic of Georgia, when he was leaving that country for Great Britain in 1920, the date of birth was given as 5 November 1888. To have tried to correct this error would have caused delay in his departure and might even have prevented it. He was therefore obliged to use this date in all official papers; but he took steps to ensure that the true date of birth might be recorded by the Royal Society." (Wigglesworth 1971, p. 713)

Until very recently, this most authoritative account was unchallenged. However, in a brief discussion that followed our publication (Kouprianov, Fedotova, 2015) of Sir Boris's letter to his teacher and friend, Andrey Semenoff Tian-Shanski (1866–1942), Professor Sergei Fokin, a protozoologist devoting a considerable share of his research effort to a study of the history of zoology in the St. Petersburg University, mentioned a still-different date. In a private communication, he noted that 1886 was consistently used as student Boris Uvarov's birth year in the university papers.

This demanded some clarification. November 5, 1889, indeed, posed certain problems for the interpretation of early stages of Sir Boris's career. Taking 1889 as the basis of the calculations one might conclude that Sir Boris graduated from the secondary school when he was under 13 (1902), and entered the Higher Mining School in Ekaterinoslav when being still under 15 (1904). It is beyond dispute that Boris Uvarov was perceived by his fellow students as a gifted young researcher, but nobody, it seems, considered him as a *Wunderkind* being several years younger than his classmates.

Sir Boris Uvarov, at the beginning of his career, was a civil servant for the Ministry of Agriculture. To identify the birth date and some other details of the biography of an Imperial state official is not a particularly complicated task provided that the records are available. Anastasia Fedotova managed to find both the Student file of the future Sir Boris Uvarov and a number of documents concerning his service for the Ministry. Among other documents, there was an excerpt from the Registry book of the Alexander Nevskii Orthodox church in Uralsk (now Oral, Kazakhstan), which should be considered as the most authentic evidence pertaining to the date of birth. In this excerpt, it was stated that "in the chapter No. 203 of the male sex, by Titular Counsellor Petr Petrov Uvarov and his lawful wife Alexandra Vukolova, both Orthodox, their son Boris is registered born on the twenty second (22) day of October, eighteen hundred eighty six (1886), and baptised on the second (2) day of November of the same year." (Excerpt from Registry book).

It is worth noting that, in the date of birth indicated in the excerpt from the registry book, not only the year is different from the one indicated in standard biographies but the day too. In Russia, the Gregorian Calendar was adopted from February 14, 1918 on. The difference for the 19th century comprises 12 days, thus the Gregorian date of birth for Sir Boris is November 3, 1886. Often, the dates for this period are written in the format including both calendars: 22 October (3 November) 1886. The date provided by Sir Vincent Wigglesworth (November 5) does not correspond to the date of baptism either and is

Figure 2. A band of wingless Moroccan locust crosses a locust-fighters' tent (reproduced from Uvarov 1913).

Figure 3. Vermorel horse-driven sprayer pumps (reproduced from Uvarov 1913).

apparently incorrect. A further inquiry in the Archives brought more details on Sir Boris Uvarov's early career and his activities in the field of applied entomology in Russia. However, this shift of the most basic dates (frequently, the dates of birth and death are the only biographical details communicated in a brief mention of a person) for a well-known historical figure has got a merit of its own. It is even more remarkable as it apparently catches off-guard those willing to celebrate the 130th anniversary of the Leader of anti-locust armies (as one of the biographers called him, see Kryzhanovskii 2001) in 2019. This quasi-anniversary date was quietly passed by in the fall of 2016.

Perhaps the date of birth itself is not too important, but, as historians of science, we hope that the small 'domestic' details of the early Uvarov's biography would allow us to see a live person behind an idealised figure of a brilliant scientist and administrator. In our case, Sir Boris Uvarov turns from an unusually single-minded young genius led by the providence itself or, at the very least, by the wisdom of the imperial state to the inevitable final victory over the locust armies into a youngest of the three sons of a humble provincial bank clerk. His early life is full of uncertainty, random walks through blind alleys, and uneasy moments of unpleasant choices. Boris Uvarovs' letters to his friends and colleagues from the early 1910s kept at the Academy of Sciences Archive in St. Petersburg reveal these uneasy early steps of his career. His way to the university diploma was anything but smooth. He had to take an extra year at the secondary school (he attended a second-rate school of the Ural Cossack Host, and even to enter a Higher Mining School, an extra year was needed). His studies at the Higher Mining School in Ekaterinoslav were interrupted by the revolutionary upheaval of 1905. He was not readily admitted to the St. Petersburg University because without a classical gymnasia background he was allowed to enter as an external student only, and he had to take additional exams in Latin to become a valid, full-time student. Right after the graduation from the University, already burdened with family, he had to seek employment in a less prestigious field of applied entomology. Already after turning from a zoogeographer into an applied entomologist, he moved to the Stavropol province in Southern Russia, not because he was sent there by the wise government as an experienced anti-locust fighter, but because he was desperately looking for better-paid employment to escape from a miserable salary and hostile bureaucratic environments (his first position was at the Murgab Entomological Station in Turkmenistan under the auspices of the Ministry of Imperial Court). It was only in Stavropol where he managed to put together for the first time a complex socio-technical locust control machine, which involved skilled professionals and modern insecticides, and performed markedly better than the old system based on local dwellers' forced labour and inefficient 'mechanical' means of locust extermination. The machine he time and again rebuilt later in Transcaucasia, North Africa, and elsewhere – and which made him The Sir Boris Uvarov we know, the Father of Modern Acridology.

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Can we help Orthoptera taxonomy in the tropics?

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The great majority of biologists have grown up and been trained in the North or South Temperate Zone. For a variety of historical and geographical reasons, these zones have countries that are relatively rich, and have had some academic culture for a considerable time. One of the consequences is that there is a general popular knowledge of natural history; the more obvious parts of the fauna and flora are known and named, and most people assume that it has always been thus. There is little obvious need for further research, and taxonomy and systematics are not self-evidently useful occupations.

When the temperate zone biologist first goes to the Tropics, he or she is faced with a quite unfamiliar situation in which none of the above generalisations are true. Most organisms are unfamiliar and there is no relevant literature to help, apart from the inevitable handbooks of local birds and of flowering trees and shrubs, which are aimed at the "eco-tourist". Most people one meets are unfamiliar with local plants and animals, and if by chance they do have a name for them, it is likely to be in an indigenous language inaccessible to the visitor. Apart from hunters and traditional herbalists, no one knows any natural history. If you are persistent and seek out a local biologist, you may find, to your astonishment, that the organism has no scientific name; it has not yet been described. Suddenly you realise that taxonomy is a valid subject - still!

So, given all the above, can we expect to find thriving laboratories of systematics in the Tropics? Sadly, no - tropical graduate students who resist the siren call of fashionable molecular biology training abroad are likely to end up in some branch of applied ecology, censusing populations of vectors or crop pests, which can plausibly be presented to local politicians and purse-string holders as useful or conducive to "development". Some of them come to grief because they cannot reliably distinguish the taxa they come into contact with, or belatedly realise that their study organism is embedded in a vast ecological network that they cannot access, due to a lack of knowledge of the relevant names. And sometimes, such a young ecologist will feel the need to acquire taxonomic skills, as an adjunct to the techniques he or she already has. Then dawns the realisation that most practising taxonomists are located in the Temperate zone - to say nothing of the type specimens that largely reside in Temperate Zone Museums - and that there is effectively no source of funds to provide access to them.

I am well aware of this situation, largely because of my 50-plus-year connection with Makerere University in Uganda, where I held my first university lectureship in the '60s. Allow me to mention a couple of examples. I recently was a member of the thesis committee of a Ph.D. student in Makerere who worked on the population ecology of Ugandan forest moths - and of forest grasshoppers. Why the grasshoppers? Simply because I was available periodically to identify them and provide some acridological background to her work. Now she is the only Ugandan who can identify any of the grasshoppers found in her country. We would have liked to include some training in cladistics and working with genitalia, but there was no funding to allow either of us to visit the other's laboratory. Another example - in 2005, I described in the J*ournal of Orthoptera Research* (*JOR*) a new Ugandan species of the forest grasshopper genus *Pterotiltus*. That *JOR* article came to the attention of a Cameroonian student busy censusing the grasshoppers of the South Cameroon plateau, which is about the centre of distribution of the genus, and last year he wrote to me. Could I advise on where to find literature on *Pterotiltus* and how to identify the different species? No, unfortunately: the genus has never been revised, there are only the original descriptions, in a medley of European languages, including Latin. So, we decided to work together and make a revision. The problem was the airfare. An application to the T. Cohn fund of our Society was unsuc-