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Contents

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APIS

Editorial

Preface to the first issue

First of all, thank You for your interest!

There is more literature on bees than on any other animal collectively. So, why is there a need for a new specialist journal? There are several reasons for this, perhaps the most important being the shortcomings of current scientific publishing strategies.

Knowledge has value, and shared knowledge holds public value. There are many players in this value-creating chain: Research institutions provide facilities, heating, cooling, expensive equipment, materials, and, of course, salaries and fees for researchers. Researchers contribute their years of training, the essential parts of their acquired experience, literature reviews, research ideas, methodological design, significant labour, endurance through setbacks, and ultimately the writing of research articles. This is, of course, a simplified picture, but it captures the essence.

In the past, publishers took on risks by editing and printing scientific journals. Today, their role has diminished: they may edit and organise peer reviews, but publishing on the internet no longer requires them to take on the risks and costs of printing.

A critical question is: to what depth can a reviewer examine a paper? Scientific articles require such detailed and deep knowledge that few reviewers are truly able to assess an article comprehensively. Most cannot replicate the experiments, nor do they have the necessary time or funding. The more knowledgeable an expert is, the less free time they tend to have.

This restricts the pool of reviewers to a narrow field, with only a few having the necessary depth to evaluate a given area.

Most open access journal publishers charge high fees for publishing. This is understandable if they are shouldering the risk of maintaining staff and, of course, needing to generate profit for the business.

Mathematicians were among the first to challenge this system in 2013, founded *Forum of Mathematics, Pi* and *Forum of Mathematics, Sigma*. Since they were already reviewing each other's articles, the modest editing work required with modern tools no longer justified spending $1,000–$7,000 on a basic open access journal. Thus, Diamond Open Access journals were created. Here, there are no costs for the reader or the author. If there are costs, they are minimal. These journals operate not for profit but to facilitate scientific exchange among experts, allowing free sharing of results. These journals do not impose censorship. What do we mean by censorship? If a journal is primarily selling its name and impact factor, with citation indices embedded, then the publisher has no interest in articles unlikely to attract high citation numbers. This creates a filter, a form of censorship, and other motivations are not excluded.

Emerging scientists are often measured by their impact factor articles, H-index, and various other metrics. These scientists include significant publication costs in their research budgets, but smaller labs, independent researchers, and individuals are automatically excluded if they cannot afford these costs. Fee waivers are occasionally available, but the process can be humiliating.

There is also a group of people who observe and may even conduct research independently. For example, in this issue, we have a beekeeper who, upon hearing of an upcoming total solar eclipse, decided to observe his bees. He set up a video camera, recorded their behaviour, and analysed it. Naturally, he did not wish to spend thousands of dollars on publishing this.

APIS does not pursue an impact factor, nor do we reject articles that may negatively affect our impact factor. But we insist on quality and employ a three-fold peer-review process to ensure it.

Thus, it is likely that the strength of our journal will not lie in its impact factor, though valuable insights may still emerge. Who are those indifferent to impact factor? Beekeepers. If someone observes unusual bee behaviour, why shouldn't they describe it? Every beekeeper wants to protect their bees in the best way possible, to farm economically, and to share experiences with fellow beekeepers. Many doctors and natural health practitioners also want reliable data from case studies not to climb the scientific career ladder but to help their patients. Integrative medicine encompasses all branches of healing —including apitherapy— with the goal of giving the patient the best possible chance to recover, or at least maintain their current condition. The WHO has made it its mission to promote integrative medicine. To make integrative medicine's experiences and results widely known, they must be described rigorously, made accessible to everyone, and indexed for searchability.

Students, too, have an interest. By publishing intermediate results, they inform the world of their work, and labs looking for young talent can stay informed.

This list goes on, and we hope that the articles we publish will reflect these ideals.

We welcome submissions from any beekeeping conference, including abstracts, posters, and full articles, as well as individual articles, article updates, book reviews, and historical event descriptions. We provide a platform for all topics addressed by the seven Scientific Commissions of Apimondia, the International Federation of Beekeepers' Associations, are as follows:

1. **Beekeeping Economy**
   Focuses on the economics of beekeeping, including market trends, trade, honey production, and the overall impact of beekeeping on the economy.

2. **Bee Health**
   Deals with issues related to the health and diseases of bees, including pests, pathogens, and management practices to protect and sustain bee populations.

3. **Pollination and Bee Flora**
   Covers the role of bees in pollination, the interaction between bees and plants, and the importance of maintaining biodiversity and healthy ecosystems for optimal pollination.

4. **Technology and Quality**
   Concerned with advancements in beekeeping technology, tools, and techniques, as well as the quality standards for bee products such as honey, beeswax, and propolis.

5. **Apitherapy**
   Explores the therapeutic uses of bee products like honey, bee venom, propolis, and royal jelly in promoting health and treating various medical conditions.

6. **Rural Development**
   Examines the role of beekeeping in sustainable rural development, poverty alleviation, and enhancing the livelihoods of rural communities.

7. **Bee Biology**
   Involves the study of the biology of bees, including their genetics, physiology, behaviour, and ecological significance.

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Editor-in-Chief

Dr. János Körmendy-Rácz

APIS

Original Article

Preparation Method for Protocols of Case Studies in Apitherapy – The Common Language of Integrative Medicine ✦

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ABSTRACT

The integration of apitherapy into modern medicine requires robust documentation and communication of its clinical efficacy. This paper addresses the need for standardized protocols to guide case studies in apitherapy, ensuring credibility and comparability across treatments. By outlining essential parameters for case documentation—including patient history, experimental conditions, product characterization, and evaluation criteria—this framework aims to enhance the quality and acceptance of alternative treatments. The proposed methodology aligns with established guidelines from organizations like the Joanna Briggs Institute and Cochrane, facilitating the adoption of a common language in integrative medicine. Standardized protocols will support practitioners in demonstrating the efficacy of apitherapy while adhering to ethical and regulatory standards. Ultimately, these measures aim to bridge the gap between anecdotal evidence and scientific validation, fostering greater trust and integration of apitherapy within conventional medical practice.

Keywords: Apitherapy, Case studies, Integrative medicine, Protocol development, Medical documentation, Standardization, Complementary treatments

INRTODUCTION

The primary goal of healthcare is to heal and, at the very least, alleviate the suffering of the patient. No other objective should override this fundamental principle. However, for healing to have a broader societal impact, effective communication is essential. This makes the success of treatments a matter of public interest, extending beyond individual recoveries.

It is challenging to inspire trust in patients, societies, policymakers, and legislators without a clear explanation of the treatment's nature. In certain countries, apitherapy has historically relied on anecdotal evidence, leading to its perception as a form of holistic medicine. Miraculous stories of recovery in distant regions, attributed to unknown healers, often prompt scepticism. Such cases raise important questions: Did the patient's belief in the treatment trigger natural healing mechanisms? Was it merely a placebo effect, or was the entire narrative exaggerated?

In countries like Italy, France and Poland etc. every scientific study must adhere to the language and rules of conventional Western medicine. Research that falls outside of these strict parameters is typically dismissed. Similarly, in the Netherlands, clinical studies are subject to rigorous regulation by ethical commissions, ensuring both safety and high quality. However, collecting retrospective data—after a treatment has been completed based on the physician's deci-

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✦ indicating if an article involves authors who are members of the editorial team (editor, editorial board member, or reviewer).

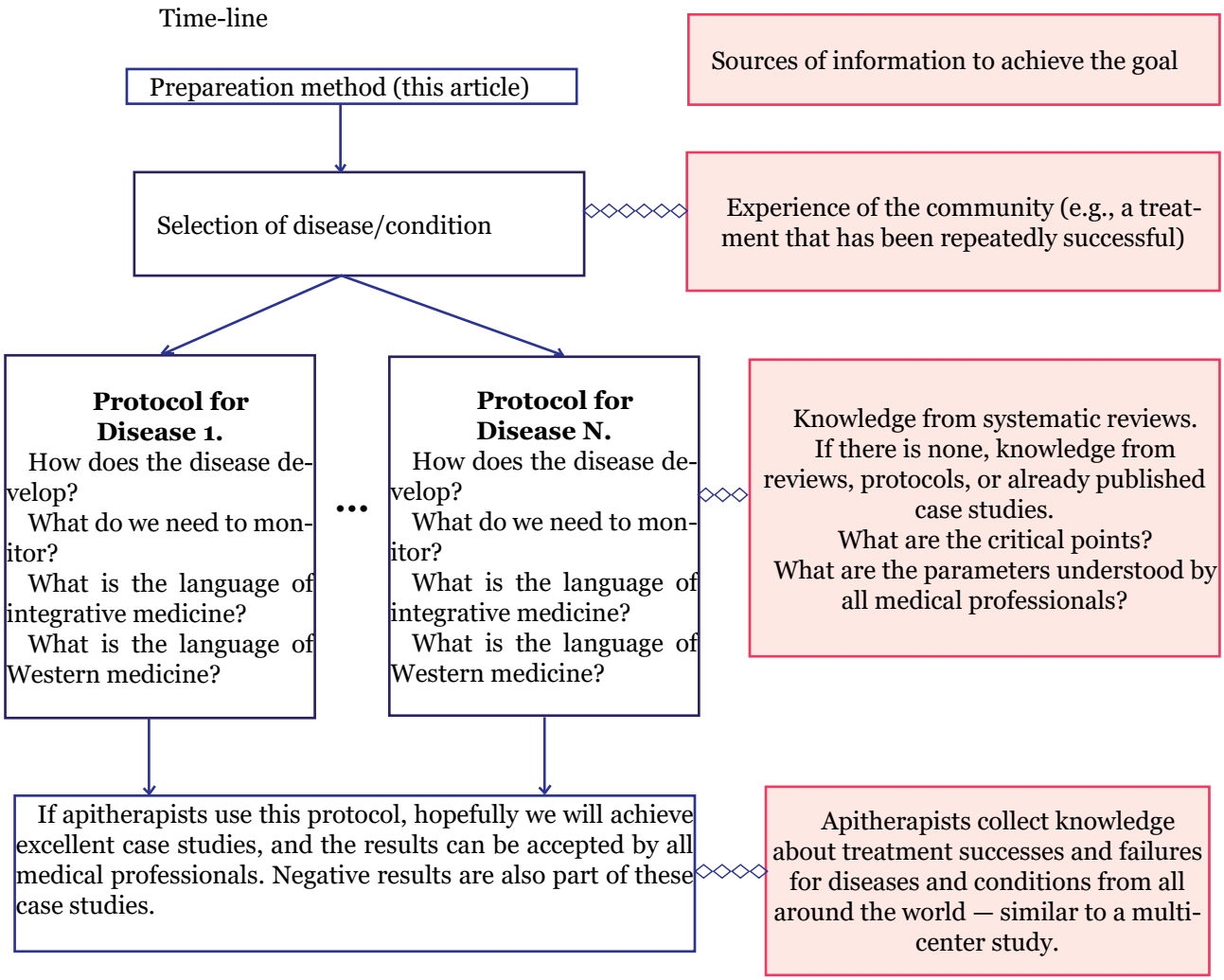

Figure 1. Graphical abstract

sion, even in off-label cases—does not require ethical approval.

Nevertheless, adherence to the Declaration of Helsinki and the General Data Protection Regulation (GDPR) is mandatory, and obtaining informed consent is highly recommended.

THE ROLE OF CASE STUDIES IN MEDICAL RESEARCH

In addition to clinical trials, case studies can provide invaluable insights for the medical community, especially in fields like apitherapy. However, this practice is not widespread in some countries, such as France. Only a few university hospital doctors occasionally undertake such studies, and even then, only in cases where no conventional treatment proves effective or when the patient refuses standard care. These case studies often address rare or poorly understood pathologies.

To ensure that case studies are credible and their results are valuable, it is essential to define certain parameters before beginning the study. Key information must be established and reported, such as:

- The patient's anthropometric characteristics,
- Their medical history,
- The reasons for not following the conventional treatment recommended by medical associations (e.g., treatment failure),
- The experimental conditions under which the treatment was administered,
- A precise physico-biochemical characterization of the product used,
- The evaluation criteria applied to measure results, whether through biological markers or validated assessment scales.

Thorough examination and evaluation of case studies are crucial to provide reliable and accurate information to both patients and physicians who are searching for effective and credible treatments. Properly designed and documented case studies can play a significant role in demonstrating the efficacy of alternative treatments, including apitherapy, and contribute to the body of evidence needed for broader acceptance.

THE ROLE OF APITHERAPY IN MODERN MEDICINE

Apitherapy represents a treatment that is officially accepted in some countries, tolerated in others, and outright banned elsewhere. This disparity underscores the need for precise and well-documented studies to ensure that those with experience in apitherapy can share their knowledge reliably with others. It is important that competing interests do not impede the application of proven treatments.

One of the most critical requirements for effective communication is a shared language between those delivering and those receiving medical information. This includes using consistent terminology, employing the same validated methods to track disease progression or regression, and documenting the healing process in a standardized way.

In medical literature, systematic reviews, such as those produced by the Cochrane Review [2], represent one of the highest standard. These are followed by traditional reviews, clinical trials, and case studies. To establish a common language within integrative medicine, especially in the field of apitherapy, the following steps are essential (see figure 1):

1. If an apitherapist or physician achieves positive results in treating a specific disease, the first step is to focus on that particular condition. The next step is to determine whether a systematic review exists on the treatment of that disease, regardless of the treatment method used. A systematic review will highlight the critical factors of the studies and identify any gaps that could render the case study invalid.
2. If no systematic review is available, the practitioner should look for reviews, clinical trials, and case studies. Paying close attention to their methodologies and the language used will reveal the common terminology and frameworks doctors and patients use to measure healing and outcomes with other treatments.

In cases where neither a systematic review nor a traditional review is available for the specific disease, the general rules must be applied and adapted to create a protocol for that disease.

The Joanna Briggs Institute [1] has developed several simplified checklists for case reports, case series, and other study types. These checklists provide a structured approach to ensure that key elements of the research are adequately addressed. Cochrane also offers widely accepted checklists, such as the Risk of Bias tool II for randomized controlled trials and ROBINS-I [3] for cohort studies. For animal studies, the ARRIVE guidelines [4] are available.

ESTABLISHING A FRAMEWORK FOR FUTURE CASE STUDIES

A comprehensive article detailing the processes for assessing, monitoring, and documenting recovery for a given disease could serve as a guide for future case studies. Such a guide would need to remain independent of any individual case reports to ensure that its methodology is unbiased by specific treatment outcomes.

The common language of integrative medicine will not remain static. As new knowledge emerges and our understanding of diseases evolves, so too will the language and standards we use.

Particular attention must be given to obtaining informed consent from patients, enabling their cases to be communicated. Additionally, it is important to report cases where treatments did not yield positive results, as this enhances the reliability of the information and helps identify the limitations of certain products or potential interactions with medications.

CONCLUSION

The development of protocols for each specific disease, aimed at gaining wide acceptance among healthcare professionals, is a crucial first step. These protocols will enable practitioners, both medical doctors and naturopaths, to create “perfect” case studies in the future. To achieve this, it is essential to synthesize the insights gathered from existing systematic reviews, general checklists, and the established measures commonly used in traditional medical case reports for tracking disease progression.

Once the scientific groundwork is laid through these protocols, healthcare professionals can apply them in practice, ensuring consistent, high-quality documentation of treatments and outcomes. This structured approach will not only strengthen the credibility of case studies but also contribute to the integration of apitherapy and other complementary treatments into broader medical practice, fostering a common language in integrative medicine.

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APIS

Original Article

Famous Yet Forgotten Natives of Baja: Bódog Beck, the Father of Apitherapy

János Mayer[1]

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ABSTRACT

This article revisits the life and legacy of Dr. Bódog Félix Beck, a native of Baja, Hungary, whose pioneering work in apitherapy earned him international recognition, yet remains underappreciated in his hometown. Born in 1868, Beck trained as a physician in Budapest before emigrating to the United States in 1901, where he gained prominence for his innovative use of bee venom therapy to treat rheumatic conditions and arthritis. He authored *Bee Venom Therapy* (1935), a foundational text in the field, and *Honey and Health* (1938), which explored the cultural and medical significance of honey. Despite initial controversy, Beck's methods influenced modern medical and pharmaceutical approaches to apitherapy, cementing his status as a trailblazer. Beyond medicine, he actively engaged with the public through lectures and publications. Beck's contributions, including a vast library integrated into Cornell University's Phillips Collection, remain influential today. Efforts are now underway in Baja to honor his memory through a memorial and the establishment of the Dr. Bódog Beck Memorial Medal by the Hungarian Apitherapy Association. This article seeks to reclaim Beck's rightful place among Baja's distinguished figures and highlight his enduring scientific impact.

Keywords: Dr. Bodog F. Beck, life, memorial, apitherapist, author

There is no end to the number of our fellow townspeople who have left our city and gone on to achieve great renown elsewhere. Many of them rightfully occupy a place in the pantheon of honoured and distinguished individuals from Baja, while the names of others have been undeservedly forgotten. The following recalls the memory of a distinguished researcher and physician born in Baja, who is celebrated for being the first to employ a pioneering healing method of his time, though, regrettably, his name remains relatively unknown in his hometown.

Félix Bódog Beck was born on 6 August 1868 in Baja, the third and youngest child of a local Jewish family. His childhood home was located at 353 Laubengasse (now Lomb Street), identifiable as the building still standing at the corner of Attila Street and Alkotmány Street. His father, Sámuel Beck, was a grain merchant, and his mother, Róza Kohn. (According to available documents, no connection is confirmed between this family and Károly Beck, the poet, who also hailed from a Jewish family in Baja.)

Between 1875 and 1879, Beck attended the primary school of the Jewish community in Baja, continuing from 1879 to 1889 at the Cistercian Order's Catholic Secondary School (today's III. Béla Grammar School). (He had to repeat the 3rd and 6th grades.) In his final years of secondary school, he had become a good student, and in 1889 received a gold medal from the local Jewish community for his achievement in history. During his school years, he became proficient in both Hungarian and German, and also studied Latin, Greek, and Hebrew in the context of religious practice. (He later went on to learn French and English as well.)

From 1889 to 1894, Beck attended the Faculty of Medicine at the Royal Hungarian University in Budapest, where he studied under some of the leading medical professors of the time (such as Endre Hegyes, Géza Mihálkovics, and József Kovács). During his studies, he was also a member of the Budapest Volunteer Ambulance Association, and in 1890, he received recognition for his work. He was awarded his medical doctorate in September 1894, initially specialising in surgery. He began his medical career at St. Stephen's Hospital in Budapest, and also served for a time in the military. Alongside practical medicine, he took an early interest in theoretical questions; his publication on cervical cysts in the *Orvosi Hetilap* (*Medical Weekly*) in 1896 sparked considerable professional debate.

In 1901, probably following his older brother, Beck emigrated to the United

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States, where he began practising in Manhattan, New York. (He received citizenship in 1919.) In 1906, he married Anna Kreuder (or Krender), of German descent; however, the marriage soon ended, and they had no children. His first scientific work focused on cancer research and surgery, including the use of X-rays to assist in diagnosing cancerous tumours. Beck became most professionally renowned for establishing bee venom therapy (also known as apitherapy, a term he coined), a technique he reportedly first encountered in Germany. For some time, he had collected data on the harmful and beneficial effects of bee stings, and based on this research, he began performing treatments in the United States using live bee stings. This method proved particularly successful in treating movement restrictions and arthritis resulting from rheumatic conditions. His accumulated experience led to his book *Bee Venom Therapy* (1935), which remains a seminal work in the field: it examines the effects of bee venom during treatment, the method of healing, and the stages of the recovery process. Beck's book, initially controversial, helped lead to the development of bee venom-based medicines and injections by some pharmaceutical companies, though his method (using live bees) faced criticism. Eventually, however, numerous researchers supported his approach, and the effectiveness of his method was then measurable with instruments. His second book, *Honey and Health* (1938), explored the cultural history and health benefits of honey and beekeeping. (After the author's death, this book saw ten more editions, slightly revised and expanded.) He had planned a third book analysing his experience with more than 2,000 treated patients, but this was never completed, and the manuscript's whereabouts are unknown.

According to contemporaries and successors, Beck primarily treated patients with swollen joints and severe pain, initially administering a few stings and gradually increasing the number (sometimes up to 30–40 per session). Although this treatment was painful, patients found it tolerable compared to their months-long suffering, and many reported either a complete relief from their agonising pain or significant improvement, although some saw no change or showed allergic symptoms. Beck's research and findings remain influential among the growing number of apitherapists.

In addition to his medical work, he led an active social life, regularly giving educational lectures, writing popular articles, responding to readers' letters, and frequently giving interviews. After a prolonged illness, Bódog Beck passed away on 1 January 1942 in a sanatorium in Kingston, New York. His death was noted by the *New York Times*, which included an appreciation of his life's work. As he had no direct descendants[1], his estate was auctioned; his valuable library, containing beekeeping books dating back centuries, became part of Cornell University's Phillips Collection. (Professor Everett Franklin Phillips was one of the first scientists to recognise Beck's work, and he wrote the foreword to Beck's second book.) Beck's legacy is still held in high regard by experts in the field, and his works are frequently cited. His book on bee therapy, now often called the "*Bible of bee venom therapy*" in the foreword of its unchanged 1997 reprint, remains widely used. Although his books were never published in Hungarian, some of his studies are available in Hungarian in a book about Beck by Dr. János Körmendy-Rácz, President of the Hungarian Apitherapy Association [1]. At the joint initiative of the author and Mihály Simics, the city of Baja is creating a memorial to Beck outside his childhood home [2]. Mihály Simics also established the Dr. Bódog Beck Memorial Medal, which the Hungarian Apitherapy Association awards.

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[2] Hajdú, M.(2024): One of Baja City's New Squares Named After Dr. Bódog Félix Beck, *APIS*, Volumen 1 Issue 1, DOI: 10.62949/01317437.3192217

[1] Remark of the Editor: He had no direct descendants, and his heir was his sister.

APIS

Original Article

One of Baja City's New Squares Named After Dr. Bódog Félix Beck

Miklós Hajdú[1]

[1] Representative of Baja, Former Deputy Mayor

ABSTRACT

This article explores the dedication of a new public square in Baja, Hungary, named in honor of Dr. Bódog Félix Beck, a distinguished native of the city known internationally as Bodog F. Beck. The initiative, spearheaded by Dr. János Körmendy-Rácz and Mihály Simics, aimed to commemorate Beck's contributions through extensive historical research and collaboration with local museums and archives. The triangular square, located near Beck's birthplace, was officially named "Dr. Bódog Félix Beck Square" on August 29, 2024, by the General Assembly of Baja City. The naming decision was influenced by the site's proximity to his birthplace and the significance of Beck's legacy. The square was inaugurated on September 6, 2024, with a ceremony featuring speeches by local figures and coverage by multiple media outlets. This commemoration underscores the role of historical figures in shaping public memory and highlights the interplay between local heritage and global recognition.

KEYWORDS: Baja city, Dr Bodog F. Beck, new square

Five years ago, Dr. János Körmendy-Rácz and Mihály Simics approached the city with the idea of commemorating Dr. Bódog Félix, a distinguished native of Baja. In collaboration with local museums, they examined historical materials, studied maps, and conducted research in local and distant archives to uncover details about Beck's life [1]. He is known in the USA as Bodog F. Beck.

The city council regulates the naming of public spaces, including those commemorating notable local figures.

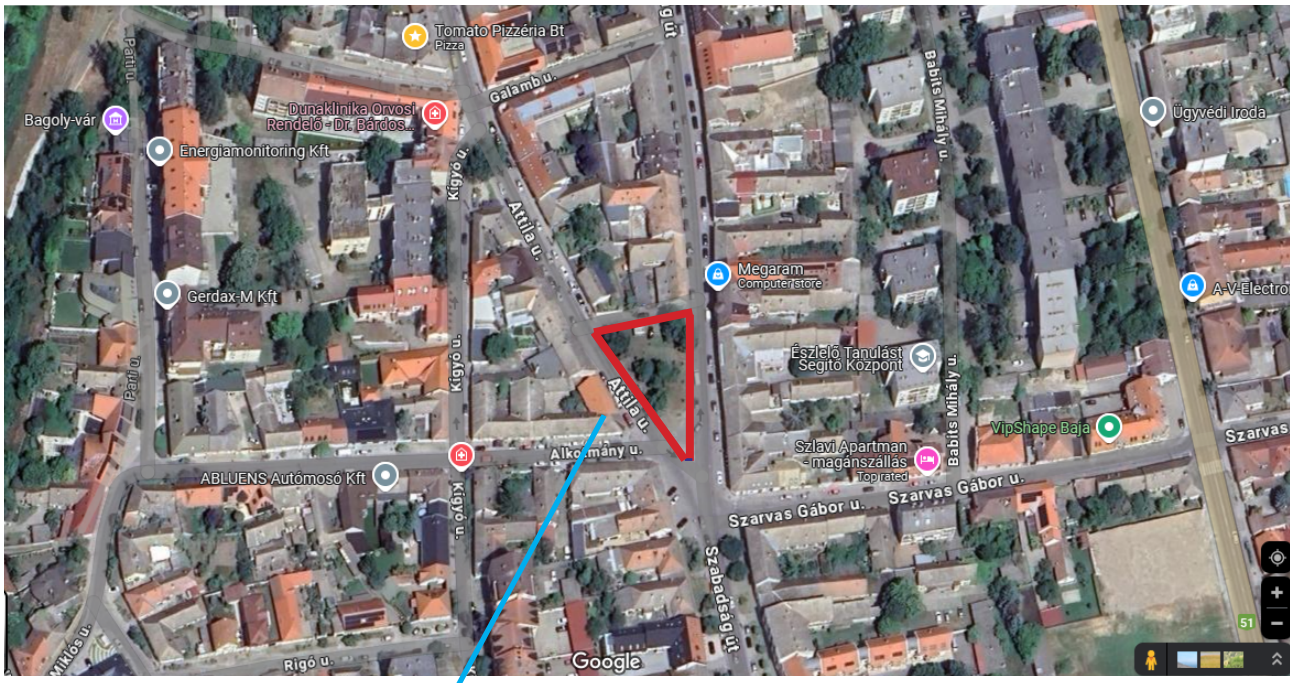
At the triangular corner near Beck's birthplace — at the intersection of Attila Street and Szabadság Road — a section of land was separated and assigned its own cadastral number. Following the land registry procedures, the opportunity arose to officially name the area.

Several proposals for naming this public space were submitted. Among them was the suggestion to name it after Beck, as well as three alternative proposals. However, it became evident that the location's proximity to Beck's birthplace made the naming in his honor the most fitting. Consequently, the committee responsible for reviewing naming proposals recommended "*Dr. Bódog Félix Beck Square*" for this location.

On August 29, 2024, the General Assembly of Baja City adopted the committee's proposal, officially naming this small square *Dr. Bódog Félix Beck* Square. Hungarian name is "*Dr. Beck Félix Bódog tér*".

On September 6, 2024, a marble plaque bearing the name of the square was unveiled. Speeches were given by János Mayer, editor-in-chief of *Bajai Honpolgár* and author of an article about Beck, as well as Dr. János Körmendy-Rácz, president of the Hungarian Apitherapy Society. The event was covered by *Baja TV* [2]. Several media outlets reported on the event, e.g., *Baja Hangja* [3].

Citation: Hajdú M (2024): One of Baja City's New Squares Named After Dr. Félix Bódog Beck, *APIS*, Volumen 1 (**2024**) Issue 1, DOI: 10.62949/01317437.3192217



Birth house of Beck

On the google map in the city of Baja you can see the new place — marked red — named "*Dr. Beck Félix Bódog tér*". The center coordinates of the place are 46.173949796601924, 18.952267862284124.

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APIS

Updated Article

Changes in Honeybee Behavior Induced by a Total Solar Eclipse in an Apiary

Baldavári, László[1]

[1]OMME - National Hungarian Beekeeping Association, Executive Committee

ABSTRACT

This study investigates the behavioral and foraging responses of honey bees (*Apis mellifera L.*) to the total solar eclipse on August 11, 1999, in a Hungarian apiary. Using video recordings, the departures and returns of foraging bees were monitored throughout the eclipse. Results revealed that foraging activity sharply declined as light intensity dropped below 10%. In the minutes leading up to totality, pollen-collecting foragers returned en masse to the hives, while departures nearly ceased. During and immediately after totality, bees exhibited disoriented behavior, including difficulty locating their hives, collisions, and abnormal buzzing sounds. Many displayed signs of fatigue, such as immobility, slow walking, and intense abdominal pulsation indicative of heavy breathing. Interestingly, bees returning from foraging resumed normal activity more quickly than those directly affected at the hive. Foraging activity remained subdued for approximately one hour post-eclipse, despite favorable temperature conditions.

These observations highlight how sudden environmental changes, particularly alterations in light intensity and sky polarization, profoundly influence honey bee behavior. The findings enhance our understanding of how bees rely on environmental cues for navigation and activity regulation, with potential implications for apiary management and ecological research during similar phenomena.

Keywords: total solar eclipse, honey bee, Apis mellifera, foraging activity, behavioral disturbance.

INTRODUCTION

During a solar eclipse, several characteristics of the physical environment—such as solar radiation components, sky polarization patterns, and meteorological elements—undergo changes [1, 3, 9, 10]. These changes can influence the activity of both diurnal and nocturnal animals, including insects [7, 8] and birds [2].

Bees are one of the most important and easily observable groups of diurnal insects. Szentkirályi & Szalay [7] demonstrated, with the involvement of several beekeepers, that the foraging activity of honey bee workers measurably changed during the total solar eclipse, and they successfully documented several characteristic behavioral responses.

Our objective was to continuously monitor and document changes in honey bee behavior during the eclipse in an apiary located within the path of totality using video recording.

MATERIALS AND METHODS

The observations related to the solar eclipse were conducted in the apiary of András Szabó, consisting of 150 colonies, near Jászszentlászló, Hungary (Bács-Kiskun County, 46°34'N, 19°46'E), close to the centerline of the path of totality, in an acacia grove. The hives of the production colonies consisted of 10-frame Hunor brood chambers and 10-frame Hunor honey supers, with frames of identical size. The bee species was Carniolan. The video-recorded observation was conducted by the author, who is a beekeeper, using a camera directed at the entrance and landing board of a specific hive.

On August 10, 1999, the weather was sunny and warm, followed by increasing cloud cover in the evening. On the morning of August 11 (at 5:30 AM), a strong thunderstorm with lightning and hail lasted for about half an hour, thanks to a marked cold front passing through the Jászszentlászló area [3, 10]. The cool, cloudy morning was followed by partial clearing after 10 AM local time, with occasional cloud cover until the eclipse. Around 11 AM, the temperature began to

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Presented by the author at the 904th meeting of the Zoological Section on May 3, 2000. The first version was published in Hungarian in Állattani Közlemények (2001), 86: 137–143.

rise, and the Sun occasionally emerged. The eclipse began at 11:29:17 local time and ended at 14:16:29. Totality lasted from 12:52:29 to 12:54:49, for 2 minutes and 20 seconds.

The air temperature was measured with a digital thermometer accurate to 0.1°C, 0.5 meters above ground in the shade, next to the hives. The temperature reached a maximum of 29.5°C at 11:40, just before totality, and a minimum of 19.6°C was recorded 10 minutes after totality. The temperature dropped by 9.9°C during the observation period.

From the repeated viewing of the video footage, data characterizing the bees' foraging activity and changes in behavioral elements could be retrospectively determined. Every ten minutes, the number of bees that flew out for foraging in one minute, as well as the number of workers returning with pollen or only nectar or water, was counted. The temporal changes in these activities are shown in Figure 1. Further analyses can be found in the article by Szentkirályi and Szalay [7].

RESULTS

The video recording commenced at 11:37, when the temperature was 25.3°C. Prior to the solar eclipse, the bees continued their foraging activities intensively and uninterruptedly until 12:10. The following changes were documented during the solar eclipse:

- **11:40** Due to a brief period of sunshine, the temperature peaked at 29.5°C. Subsequently, the air temperature gradually decreased until the first ten minutes after totality.
- **11:49** The sky was again veiled with thin clouds.
- **11:50** The temperature measured 23.8°C. Approximately the same number of bees were observed leaving the hives as were returning.
- **12:00** The temperature dropped to 22.0°C.
- **12:01** The sky became overcast. The number of departing and returning bees was nearly equal.
- **12:03** The Sun emerged from behind the clouds.
- **12:04** Pollen-carrying activity was consistent.
- **12:05** onwards The Sun was obscured by clouds.
- **12:10** The temperature recorded was 20.9°C. The atmosphere in the apiary resembled that of late afternoon.
- **12:20** The temperature fell to 20.6°C. From this point onwards, more bees returned than departed for foraging.
- **12:23** The Sun re-emerged. The air temperature slightly increased to 20.8°C.
- **12:25** The sky became cloudy again (21.0°C).
- **12:30** The temperature was recorded at 20.9°C. The dimming became increasingly noticeable.
- **12:35** A twilight-like darkness akin to evening at 19:00; numerous bees gathered at the entrance, with the Sun occasionally reappearing.
- **12:40** The temperature measured 20.3°C. The sky remained cloudy.
- **12:42-12:43** The Sun was shining while the sky appeared gray. The number of returning bees began to increase.
- **12:45** There was a sudden surge in the number of bees returning with pollen, while the frequency of departures decreased.
- **12:48** The Sun shone brightly. Due to the mass return of pollen-carrying bees, there was significant commotion in front of the hives. Bees not only entered their own hives but also intruded into neighboring ones.
- **12:49** The Sun was again obscured by clouds, and the shadows were not visible. The pitch of the bees' buzzing increased, becoming louder.
- **12:50** The temperature was 19.7°C. The Sun emerged again, with incoming bees flying up to the top of the hives.
- **12:51** Continuous dimming occurred as the eclipse approached totality, resulting in near-darkness. Bees that were outside flew above the acacia trees, buzzing as if swarming.
- **12:52:29-12:54:49** During the total eclipse, the temperature remained at 19.7°C. The darkness resembled night. A large number of bees were seen hovering in the air outside the hives. Bees disappeared from the entrances and retreated inside the hives, where the buzzing sound diminished.
- **12:55** Light began to return. The bees moved from the trees toward the hives, creating chaos among them. They collided with various objects, including the observer's body, the camera, tree trunks, and the hives. All bees attempted to enter the hives simultaneously, resulting in significant disarray at the entrances.
- **12:56-13:00** Prior to the end of totality, many bees entered other hives and returned with their pollen loads upon the Sun reappearing. Pollen-carrying bees seemed to almost fall onto the landing board, with their abdomens pulsating strongly. After landing, they did not immediately enter the hives. They were observed sitting motionless, not only on the landing boards but also on the hive's front walls. Their posture suggested they were leaning forward at an angle of approximately 10 degrees, pressing against the landing board. They moved their antennae to detect the scents associated with their own colony emanating from within the hive. They appeared fatigued and struggled to move under the weight of the pollen. One examined bee was seen fanning with its wings, rhythmically expanding and contracting its abdominal segments, bending the last segment (where the venom sac is located) downwards, while standing in an unusually wide-legged stance. Many such sluggish bees were observed. Activity at the landing

boards ceased. Only a few bees were seen flying; the air felt very humid and cool.

- **13:02** The temperature was 19.6°C. Bees that had experienced the total eclipse while foraging on flowers outside were now returning to the hives, appearing fresh and not fatigued.
- **13:03** The Sun was shining, evoking a morning atmosphere. Bee activity came to a complete halt, with no bees entering or leaving the hives.
- **13:04** The Sun shone brightly, and the temperature remained at 19.6°C.
- **13:06** No bees were in the air.
- **13:07** The temperature was 19.6°C. No bees were flying. Pollen-laden bees had also retreated into the hives. There was no activity at the entrance, and the buzzing had quieted down.
- **13:10** The temperature was recorded at 19.7°C. The temperature began to rise. The minimum temperature of 19.6°C persisted for six minutes. The sky was veiled with thin clouds, and fast-moving clouds approached from the south.
- **13:11** The temperature was 19.8°C. More bees began to appear at the entrance.
- **13:14** The temperature was 19.9°C. There was still no mass departure of bees.
- **13:19** The temperature measured 20.2°C. The Sun was shining. The video recording concluded.

Following the last temperature measurement, we continued to observe the bees for nearly an hour. By around 14:00, normal activity had still not resumed in the hives, and significant movement was not observed, with only one or two bees leaving the hives.

EVALUATION

It is a general observation that when a large, thick cloud passes in front of the Sun, or when a thunderstorm approaches, the darkness causes bees to cease their foraging activities and immediately return to their hives [5, 6, 7].

Based on this, it was expected that the increasing and accelerating darkness accompanying the solar eclipse would trigger the return of foraging bees. According to our observations, around 12:40, when the relative light intensity of the Sun had already decreased to 10%, the bees began to respond strongly to this environmental change, and subsequently, they returned en masse to their hives.

Earlier, the collection of pollen, nectar, and water (the latter being very important during the brood-rearing period) was carried out with appropriate intensity, meaning that the number of departing and returning bees was roughly in balance per unit of time. Until 12:40, the number of bees leaving the hive continuously increased (Figure 1); after that, it significantly decreased, and for a longer period during and after the total eclipse, departures nearly ceased. The number of bees returning with pollen moderately increased until 12:40, fluctuating depending on the passage of the clouds. After that, there was a dramatic increase in the number of workers returning with pollen. Most bees returned to the hives in the few minutes preceding the total eclipse (see Figure 1 at 12:50).

In contrast, the number of bees carrying nectar or water showed much less fluctuation during the entire period before the total eclipse, maintaining more or less the same activity level, and only increased slightly in the last 10 minutes (Figure 1). The reason for this is unknown; however, it can be stated that only a small fraction of the workers was not carrying pollen.

By the onset of the first darkness, a significant number of bees were unable to enter their hives in time; they had to wait outside during the total eclipse and only returned afterward. Ten minutes after the total eclipse, there was practically no further return of bees. It was generally characteristic of the bees' behavior that, following the total eclipse, there was a prolonged period— in this case, lasting about an hour—during which normal foraging activity did not resume [7].

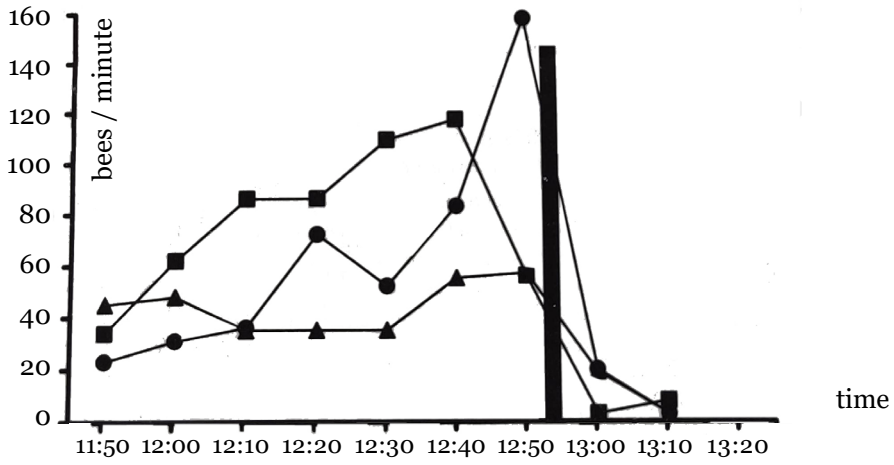

Figure 1. The number of foraging honey bee workers flying out or returning per minute at the entrance of a hive during the total solar eclipse. ■ : bees flying out; ● : bees returning with only nectar or water; ▲: bees returning with pollen.

However, this persistently low level of activity was not caused by temperature changes, as we recorded values above 20°C following the total eclipse, but rather by a response to the temporary decrease in light intensity caused by the solar eclipse.

Another documented change in the behavior of the bees was confusion, which was observed for several minutes during the total eclipse, as well as immediately before and after it. This was manifested in two ways: firstly, many bees were unable to find their own hives and mistakenly entered foreign hives; secondly, the bees that remained outside produced an unusual buzzing sound, and in the minutes following the total eclipse, they collided with everything around them, suggesting a disorientation.

These phenomena have also been reported in other beekeeping studies during solar eclipses [7]. Since this confusion occurred exclusively during the total eclipse and in its immediate vicinity, it is plausible that the significant alteration of the sky's polarization pattern during this period played a role in its development [1, 7]. This assertion is supported by the fact that bees utilize the polarization pattern of the sky for navigation during flight [1, 4].

In the minutes following the total eclipse, many worker bees appeared to exhibit signs of fatigue (e.g., immobility, sluggish walking, pulsing abdomens, and intense breathing). This may have been related to the behavioral disruption caused by the solar eclipse. Alternatively, it could have been due to the fact that the bees trapped outside had depleted their sugar reserves necessary for the energy-intensive operation of their flight muscles during the additional 3-4 minutes of flight associated with the eclipse, which they had to endure while carrying pollen.

According to some local observations, when foraging from a specific source, worker bees can relatively accurately calculate their "fuel," as from the third flight onward, they only take in as much nectar as is sufficient for an additional 100-150 meters of travel. If the honey bladder of the bees is emptied, they lack the energy for flight, and they can even perish [5, 6]. However, those bees that experienced the total eclipse while foraging far from the hive and returned later in the light did not show signs of fatigue, clearly flying back fresh and without confusion.

Upon multiple reviews of the video footage, other deviations from normal behavior were also observed. Notably, after the total eclipse, foraging bees did not immediately fly off from the entrance; instead, they first walked outside the front of the hive at a distance of 10-15 cm before taking off into the air. It was also observed during the total eclipse and in the following one or two minutes that many bees that were outside and resting on the hive walls or the landing board were ventilating by vibrating their wings.

Normally, bees perform this ventilation instinctively inside the hive after dusk, which aids in the evaporation of the high moisture content of the nectar collected during the day, essential for its conversion into honey. This external ventilation was likely triggered by the darkness during the total eclipse, which may misleadingly signal the end of the day for the bees.

It is hypothesized that the eyes of bees function as an accurate biological light meter (too). Using a lux meter, it might be possible to measure the light intensity at which they leave the hive and the light intensity at which they stop foraging.

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APIS

Original Article

Book Review: The Life of Dr. Bódog Félix Beck

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ABSTRACT

This review examines *The Life of Dr. Félix Bódog Beck*, a 239-page book in the *Literatura Apiterapiae* series, published in 2019 by Lilli Publishing House. Written in Hungarian, the book stands out for its meticulous historical reconstruction of Dr. Beck's life and contributions, enriched by rare photographs, multilingual summaries, and authentic documents. Highlights include Beck's pioneering medical work, his multilingual legacy, and his profound influence on apitherapy. The book also addresses inaccuracies about Beck's life and offers rare insights into his relationship with Franklin Everett Phillips. This work is essential for readers interested in apitherapy history, medical advancements, and historical emigration narratives.

Keywords: Dr. Bódog Félix Beck, Apitherapy, Historical biography, Medical history, Hungarian-American legacy, Franklin Everett Phillips, Emigration history, Multilingual historical summaries, Dental X-ray innovations, Beekeeping history

INRTODUCTION

This 239-page hardcover book, part of the *Literatura Apiterapiae* series, was published by Lilli Publishing House in 2019. The review's timeliness stems from a recent event: a public square was named after Dr. Beck in his hometown [1].

The book, written in Hungarian, features clean typesetting and font choices, making it accessible for reading with mobile translation apps like Google Translate. It includes numerous original articles and documents. Pre-1901 document texts are in Hungarian, while those from 1901–1942 are in English.

One of the book's highlights is its inclusion of the first authentic photograph of Dr. Beck showing his face. Previously, only an image of him with his back turned was known. Through meticulous research using extant documents, the book reconstructs many details of Dr. Beck's life. For instance, it uncovers a report accusing him of owning a (then-prohibited) radio device. However, the investigation led nowhere, likely because the equipment was an X-ray machine, which Beck used for pioneering dental examinations and cancer diagnostics.

A fascinating inclusion is certified copies of records from the New York Supreme Court, such as his marriage certificate. The author also accessed Beck's original birth record, which notes not only his birthdate but also his family's address. The book accurately cites his birthdate as August 6, 1868, based on his Petition for Naturalization.

Another standout feature is a multilingual summary of key dates and events in Dr. Beck's life, presented in seven languages: Hungarian, English, German, Spanish, Russian, Chinese, and Arabic. This summary has also been made freely available on ResearchGate [2].

A dedicated chapter addresses errors about Beck's life propagated by newspapers and other sources, particularly focusing on inaccuracies regarding his birthdate.

The book marks a milestone in the history of apitherapy. Like Dr. Philip Terč before him, Dr. Beck faced criticism from contemporary medical professionals. The book reproduces the critical article in its original English from page 112 and provides Beck's masterful 11-page response (his third surviving work) in both English and Hungarian from page 130.

The book also explores Beck's close relationship with Franklin Everett Phillips, evidenced by a photo of them at dinner with Phillips's wife, Phillips's preface to Beck's second book, and rare beekeeping books from Beck's collection now

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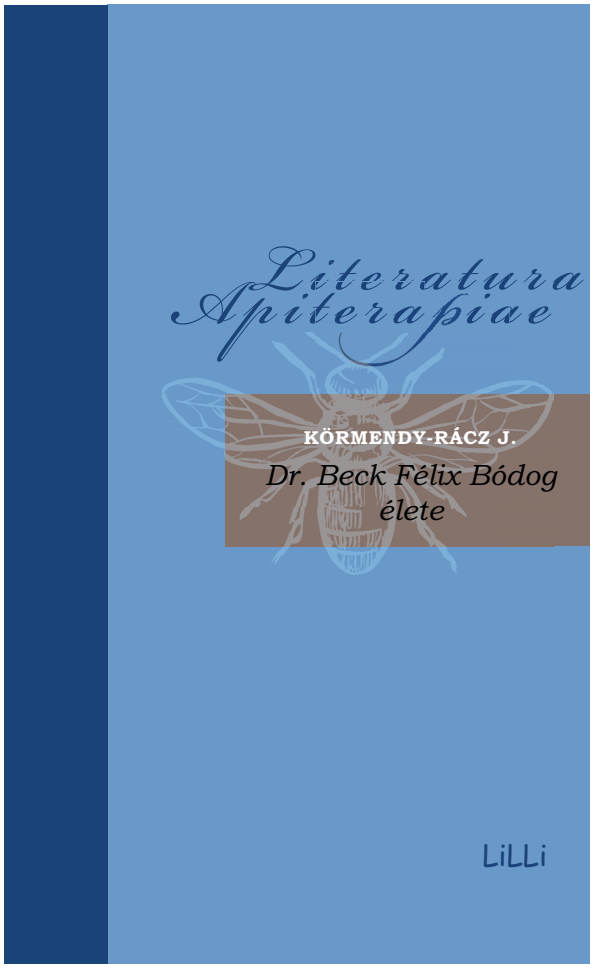

Picture 1. The cover page

housed in the Phillips Collection [3]. Some of these books have been digitized. An inscription on the book's inner cover refers to Beck's favorite reading spot, a small balcony room, noted simply as "balkony".

The final pages summarize Beck's key life events in a table and provide a detailed index.

The book is registered in the National Library of Hungary [4].

CONCLUSION

The book, rich in original documents, offers an authentic portrayal of Dr. Beck's life. It is recommended for those interested in historical contexts, a remarkable life journey, the steps of emigration to the United States, or the apitherapy-related masterpiece that is Dr. Beck's response to his critics.

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Index