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## Croatian Immunological Society: Our half century

In 2018, the Croatian Immunological Society (or *Hrvatsko imunološko društvo* (HID) in Croatian; <http://www.hid.hr>) celebrated its 50<sup>th</sup> anniversary. For this half century, Croatian immunologists have successfully kept up with the rapidly developing field of basic and applied immunology at the global level. This has made immunology in Croatia productive, rich, internationally recognized and highly competitive, illustrating that true scientific values go above and beyond the limitations of time and place. In this article we want to give a brief outline of the past,

presence and future of HID and its position within the international immunological community.

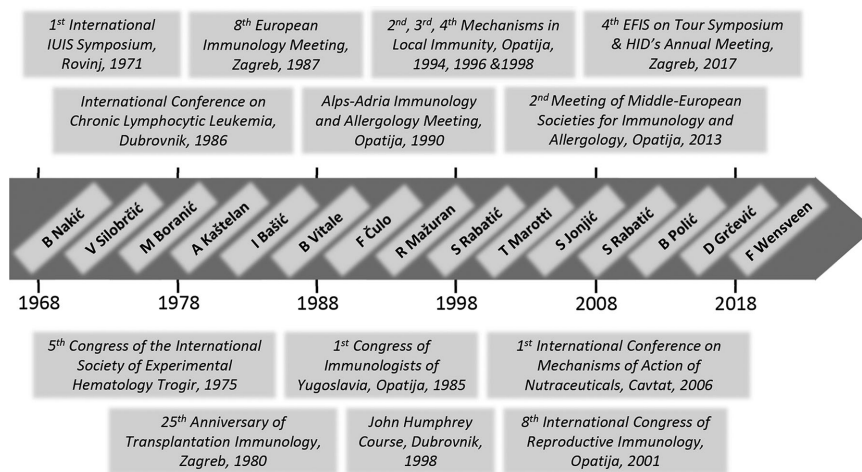
### When did immunology research start in Croatia?

The very beginning of immunology in this region goes as far back as the year 1377, when the Council of the Dubrovnik City Republic ordered precisely defined quarantine measures against various

infectious diseases [1]. Since then, Croatia has kept in case with immunological developments within the rest of the world, implementing new serotherapeutic and immune-prophylactic regimens as they became available. Well before the middle of the 20<sup>th</sup> century, extensive programs had been initiated for the prevention of variola, and vaccination against and treatment of infectious agents such as diphtheria, typhus, paratyphus, rabies and cholera, which dramatically reduced the prevalence of these infectious diseases in our region [2]. Around the 50's and 60's,



**Figure 1.** Institutions that fostered the development of immunology in Croatia, with major immunology branches started by founding research groups.



**Figure 2.** Time-line of Croatian Immunological Society president order and major international networking events since foundation in 1968.

several prominent researchers were initiators of the modern biomedical research and experimental immunology in Croatia, which was mostly carried out within seven institutions (Fig. 1). Immunological research in Croatia rapidly diversified into different branches, such as transplantation and tumor immunology, allergology, immunopathology, cellular and molecular immunology, reproductive immunology, viral immunology, vaccinology, hematology and immunotherapy. During 60's and 70's, Croatian immunologists had a major impact on the development of biomedical research in Croatia and many of them established a scientific reputation that reached well beyond the borders of our country. In addition, acclaimed immunologists (mentioned in Fig. 1 and 2) occupied important positions within Croatia as scientific policy makers, book and journal editors, as well as founders and presidents of scientific societies, thus positively impacting the academic climate of our nation [2].

Considering this ground for a specialized scientific community, only a small push was required for the founding of an immunological society. This impulse came in 1967 in the form of a letter from Bernhard Cinader (at that time Head of the Immunochemistry Subdivision at Ontario Cancer Research Centre, founder and first President of the Canadian Society of Immunology) to Vlatko Silobrić (at that time prominent researcher and Professor at Institute "Ruđer Bošković" in Zagreb, Croatia), in which the general concept of an immunological society was outlined [2, 3]. This prompted the foundation of the Yugoslav Immunological

Society (YIS) one year later on December 17, 1968 (seated in Zagreb, Croatia), with Borislav Nakić (at that time Professor and Head of the Department of Animal Physiology, Faculty of Science University of Zagreb) as its first president. Vlatko Silobrić served as its first Secretary General, and subsequently as its Vice-President and President (Fig. 2). Vlatko Silobrić and Dragan Dekaris, leading Croatian immunologists, established an international scientific journal *Periodicum Biologorum* (continuation of the local journal *Biološki Glasnik*), which in a short while became indexed in *Current Contents* and the *Science Citation Index*, and remains the official Journal of the Society ([https://hrcaak.srce.hr/ojs/index.php/periodicum\\_biologorum](https://hrcaak.srce.hr/ojs/index.php/periodicum_biologorum)). In addition, they translated the first edition of "Essential Immunology" by Ivan M. Roitt [4]. Around that time, several national societies expressed their intention to unite into the International Union of Immunological Societies (IUIS). YIS actively participated in this process and became a Founding member of the IUIS, with Bernhard Cinader as the first President (<http://www.iuisonline.org/>). As a member of the Symposium Committee of the Union, Vlatko Silobrić, together with Daniel Rukavina (eminent immunologist from Faculty of Medicine University of Rijeka, Croatia) and Oskar Springer (member of the YIS board), organized the 1<sup>st</sup> International IUIS Symposium, held in Rovinj, Croatia (1971). Soon after the foundation of IUIS, European immunologists initiated the IUIS Commission for Europe, with John Humphrey as a Chairman and Vlatko Silobrić as

one of the three Vice-Chairmen, with the aim to establish a Federation, which was eventually founded in 1975 as the European Federation of Immunological Societies (EFIS, <https://www.efis.org/>).

## Overview of Society's history

Croatian Immunological Society had initially been registered in 1968 as a section of the federal YIS, and organized its first immunology meeting as a part of the Congresses of the Yugoslav Physiological Society. Soon after, on the insistence of Croatian immunologists, the national immunological sections were transformed into republic societies, which gave them higher autonomy. This period was largely marked by the activity of our members developing transplantation immunology; they co-organized the 5<sup>th</sup> Congress of the International Society of Experimental Hematology (1975; Trogir, Croatia); initiated the formation of a national transplantation program (1974; *Yugo-transplant*); and acknowledged the 25<sup>th</sup> Anniversary of Transplantation Immunology (1980; Zagreb, Croatia), dedicated to Borislav Nakić as the pioneer of this scientific discipline in Croatia [2, 5].

The next decade of the Society was enriched by organization of several international meetings, which were among the biggest local scientific events at that time: the 1<sup>st</sup> Congress of Immunologists of Yugoslavia (1985; Opatija, Croatia), with several hundred abstracts and even more attendees; the international conference on "Chronic Lymphocytic Leukemia as a Model for Studying Immunoproliferative Diseases" (1986; Dubrovnik, Croatia), summarized in a special issue of *Blood Cells* [6]; and the 8<sup>th</sup> European Immunology Meeting (1987, Zagreb, Croatia), with almost a thousand presented abstracts highlighted by articles in *Immunology Letters* and *Immunology Today* [7, 8], co-authored and co-edited by Branko Vitale (HID President) and other members. In 1990, Dragan Dekaris and Daniel Rukavina enthusiastically initiated the international Alps-Adria Immunology and Allergology Meeting (Opatija, Croatia), attended by a remarkable number of world leading immunologists [9]. Shortly after, an armed clash in the Croatian province of Lika-Senj (*Plitvice Bloody Easter*) started the Croatian War for Independence. With the disintegration of Yugoslavia, also Croatian Immunological Society separated from YIS forever.

After Croatia's independence in 1991, the Society continued its activities as HID, and instantly expressed the wish to become an EFIS member, urged by Filip Čulo (HID President). However, only after the International Council for Science (ICSU) included HID as its regular member in 1994, EFIS and IUIS did also take the same stance. In the meantime, EFIS committed to support the international meeting "Mechanisms in Local Immunity" (1994; Opatija, Croatia), organized by Daniel Rukavina and Thomas J. Gill III (president of the International Society for Immunology of Reproduction) [9]. It was the first scientific meeting with international participation since independence, followed by another two successful meetings in the series (1996 and 1998). Finally, the EFIS president Klaus Eichman came to an official visit and held a lecture at the Croatian Academy of Sciences and Arts (1995; Zagreb, Croatia).

The 30<sup>th</sup> anniversary of HID was marked by the international "John Humphrey Course" (Dubrovnik, Hrvatska), supported by EFIS, and an article summarizing the Society's activity published in *Immunology Letters* (written by Sabina Rabatić, HID President) [10]. Enthusiastic international networking activity continued fruitfully at the start of the 21<sup>st</sup> century as HID organized/co-organized: the 8<sup>th</sup> International Congress of Reproductive Immunology (2001; Opatija, Croatia); the 1<sup>st</sup> International Conference on Mechanisms of Action of Nutraceuticals (2006; Cavtat, Croatia); and the 1<sup>st</sup> Joint Meeting of European National Societies of Immunology as a part of the 16<sup>th</sup> European Congress of Immunology (2006; Paris, France) [11]. At the local level, HID made a great effort to announce, at that time recent EFIS initiative, the International Day of Immunology (2007) by disseminating popular scientific articles, web sources and public lectures countrywide (<https://www.efis.org/public-outreach/day-of-immunology/day-of-immunology.html>). Lastly, the 40<sup>th</sup> anniversary of HID was celebrated at the Annual Meeting in 2008 (Šibenik, Croatia), with a 150-page supplement issue in *Periodicum Biologorum* discussing the history of our Society and Croatian immunology in general [2]. In parallel to basic immunology, allergology and clinical immunology have been developing progressively within the clinical departments. Thus, despite its modest size, HID has a long tradition in immunological research and networking activities, contributing

to the global advancement of the field. Thanks to the international scientific reputation, HID has been awarded several honorary memberships to the outstanding international experts: Dr Charles A. Janeway, Jr (New Haven, USA); Dr Thomas J. Gill III (Pittsburgh, USA); Dr Stefan Thierfelder (Munich, Germany); and Dr Ulrich Koszinowsky (Munich, Germany).

### Recent activities of the Society

Based in a small country with limited resources, HID recognized the need to increase collaborative activities on three levels – between immunology research groups within the country, among local institutions and societies, and with regional immunological societies.

Annual meetings that have been regularly held since 90's are the Society's central yearly activity where Croatian scientists researching basic immunology can present their novel findings and establish collaboration with other local groups, further bolstered by participation of acclaimed international lecturers. The society meetings, as a whole, are oriented to maximally benefit young scientists by encouraging their oral and poster presentations, as well as by awarding their work. It is of note that during these recent years, HID has made inroads with national and private institutions to gather substantial financial support, as an incentive for increased participation of especially junior scientists. The new and renewed contacts led not only to expansion of HID member base and increased presence of our researchers at annual meetings, but indirectly also to the publishing of the Croatian translation of the book "Cellular and molecular immunology" (ed. Abbas, Lichtman and Pillai) in 2018 [12], which provided Croatian students a comprehensive, up-to-date immunology textbook. HID members participated in "English-Croatian scientific dictionary for molecular life sciences" (introduced in 2016 at <http://rjecnik.hmdcms.hr/>), that was eagerly needed to standardize the Croatian scientific vocabulary.

In addition to regular collaborations between the Universities of Zagreb and Rijeka in holding and organizing the immunological meetings, a couple of very successful partnerships were carried out with the internationally acclaimed Institute "Ruđer Bošković" in Zagreb. This

included symposiums on Immunotherapy of Cancer in 2017 and on the Day of Immunology (DoI) in 2016, with the publication of the Croatian translation of the IUIS popular science book "Your Amazing Immune System – How It Protects Your Body" [13], edited and co-organized by HID. HID actively collaborates with biomedical and clinical societies, i.e. the Croatian Society for Allergology and Clinical Immunology, the Croatian Society for Physiology and the Croatian Microbiological Society, in exchanging lecture invitations, information of general interest, opportunities for members and co-organization of events as well as in representing common matters in front of institutions and companies, ultimately improving their status and gaining leverage on the country level.

At the international level, HID fostered the initiative of establishing a communication platform for immunological and allergological societies in the region, to improve mobility and collaboration, at a joint meeting of these societies in Vienna in 2010. The underlying idea of the joint meeting of the regional societies was very well received and the Meeting of Middle-European Societies for Immunology and Allergology (MESIA) was successfully held in October 2013 (Opatija, Croatia), with Bojan Polić as HID President and Stipan Jonjić as the Scientific Board President (<http://www.opatija2013.uniri.hr/>). The proposition for a regular, triennial schedule was adopted, and the next MESIA was held in December 2016 (Budapest, Hungary), where HID actively participated in the organization and scientific boards of the meeting.

Finally, the most recent annual meetings were, both, held on the very special occasions. In 2017, the EFIS Board accepted invitation to hold its 4<sup>th</sup> EFIS on Tour Symposium integrated into the HID's Annual Meeting, which greatly boosted the number of attendees. The event was a great success – immunology experts shared their novel findings with the audience, followed by a publishing workshop held by a representative from *Immunology Letters* and *Seminars in Immunology* [14]. Our latest Annual Meeting was held in October 2018 (Zadar, Croatia) and marked the 50<sup>th</sup> anniversary of the Society foundation's [15]. For this very special occasion, EFIS president-elect Andreas Radbruch awarded HID with a plaque recognizing Society's efforts and contribution to the advancement of Croatian and European immunology (Fig. 3).





**Figure 3.** Plaque awarded to Croatian Immunological Society by Federation of Immunological Societies president-elect, Prof Andreas Radbruch, commending Society's 50 years of commitment to the advancement of Croatian and European Immunology.

### Future perspectives

HID looks back on a relatively long history within immunological science, but it is more important to look forward and envision the Society's role in the future of immunology. Croatia is a small country with an even smaller budget for science. As a result, our society has much less members (~150) than many of our fellow societies within EFIS. More importantly, this means that not all aspects of immunology are covered by our members. For research projects, but also for well-balanced scientific meetings, we therefore must look beyond the borders of Croatia to gain expertise in some fields. In a world where scientific questions need more investments than ever to be solved, extensive collaborations between research groups are a necessity, rather than a possibility to generate breakthroughs.

Immunology is one of the most advanced fields of biological science and is still rapidly expanding. It is becoming increasingly clear that the immune system is involved in many physiological and pathological processes that reach well beyond the traditional boundaries of our field. As a result, no single immunological society contains within its ranks all the branches of immunology. It is the beauty of science in general, and immunology in particular, that we must always look out-

ward to acquire new knowledge, to build new bridges and to include new members within our community. The role of an immunological society, in our opinion, is therefore threefold: (i) to be the advocate of our field within a region, (ii) to nurture new talent and (iii) give an identity to scientists working in immunology. Especially within a small country, it is of great importance to have a society that brings local research groups together to show young scientists that they are part of a community that is there to help them to grow. Moreover, a local society provides a real, low-key, personal connection with the international field of immunology through its senior members. Despite our small size, immunology in Croatia is performing surprisingly well, with several groups reaching the highest international standards, and part of this success comes from the fact that HID provides a tight community in which its members provide mutual support. A community that is nevertheless looking outwards and welcomes collaboration with our sister societies in Europe and beyond. We are therefore confident that also future generations of immunologists will benefit from its membership to HID and make great contributions to the field of immunology.

The Croatian Immunological Society can be proud that the zeal and effort of its founders and past leaderships has not been

in vain. Rather, its members have tried to make the best of the present conditions, and it would not be overstated to say they have, at least in part, succeeded. Therefore, after half a century of our existence, we look back at a respectful history and eagerly look forward towards the scientific challenges of the future.

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