

“Nihil certum est de auditu sonituque percipiendo”: from Vesalio 1543 to the 4th Congress of the “Société Internationale d’Audiologie” Padova 1958: The Padova School (part 1).

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The official website of the International Society of Audiology reports that the 3rd international congress of the International Society of Audiology/ Société Internationale d’Audiologie was held in Montecatini Terme in 1956, organized by prof. Pieri; one of the official reports was presented by Oscar Sala (Padua) on “the Medical Therapy of Deafness” (Fig 1).

The 4th congress of the “Société Internationale d’Audiologie” was held in Padova 1958; and a relevant place had the discussion regarding the role of Audiology Vs Otorhinolaryngology and in particular Otology.

Luigi Pietrantoni, that was at the time the president of the society, declared in his inaugural speech “Notre ancienne et illustre Université de Padoue – dont les Instituts scientifiques et les Cliniques perpétuent les traditions d’un glorieux passé qui a vu se succéder au cours des siècles, de Fallope à Valsalva et à Cotugno, les grands pionniers créateurs des bases anatomiques de l’étude de l’organe de l’ouïe - était certainement l’endroit le plus indiqué de toute l’Italie pour accueillir les spécialistes de la physiologie, de la physique acoustique et de la physiopathologie auditive”.

The speech was then mainly focused on what audiology is and what are the relationships with otology and more generally with otology-laryngology.

“Notre Société est parvenue en cinq ans à son quatrième congrès...il nous faut donner au terme “audiologie” une signification précise susceptible d’éviter toute équivoque et toute confusion..Il n’a pas été créé par des otologistes, mais par des physiologistes, des physiiciens de l’acoustique et des psychologues, et, dans l’esprit de ses inventeurs, “audiolo-

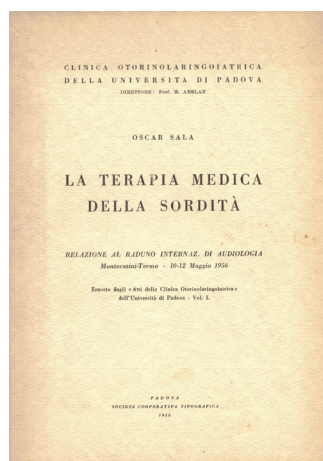


Figure 1 “The Medical Therapy of Deafness”, O. Sala (1956)

gie" équivalait à étude de la fonction auditive plutôt que de la physiopathologie et de la clinique de l'organe de l'ouïe. Il s'agit là, évidemment, d'une distinction subtile et inutile, comme l'a fait remarquer à juste titre mon illustre prédécesseur le professeur Aubin, pour la simple raison que la clinique de l'organe auditif présuppose la connaissance de sa fonction. Sur le plan pratique, par conséquent, l'audiologie ne saurait être que de l'otologie pure; une otologie, bien entendu, à haut niveau scientifique, comme l'exigent les progrès de notre époque"...."Le développement de la physique acoustique, de l'électrophysiologie et de l'électro-acoustique est de date récente et la clinique ne peut encore utiliser les conquêtes de ces branches scientifiques".

Prof Michele Arslan's greeting speech was largely focused too on the role of Audiology and its relationship with Otology (Fig 2).

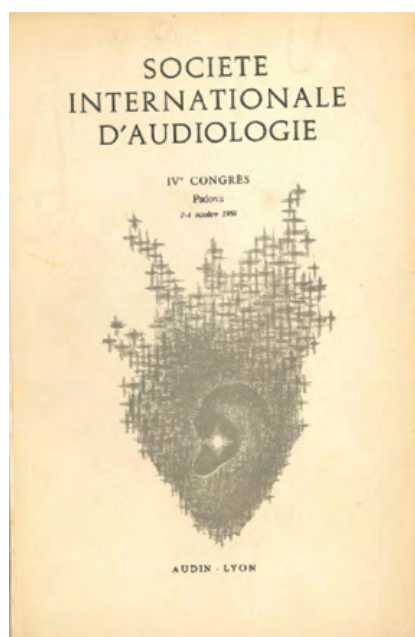


Figure 2 Proceedings of the 4th congress of the "Société Internationale d'Audiologie" held in Padova in 1958.

The Department of Otolaryngology in Padova

The history of Venetian otolaryngology begins contemporaneously in Padova (Yerwant Arslan) and Venice (Faustino Brunetti).

Yerwant Arslan (from the original surname Arslanian) (Figure 3) was born in Karput (Ar-

menia) on May 23, 1865 from a patrician family; at fifteen he left his homeland, eager to reach Italy to devote himself better to his studies; in Italy he worked at first as a night nurse in Noventa Vicentina, a small rural town between Padua and Vicenza. After completing his classical studies at the Armenian College of Venice, Yerwant admitted in the Faculty of Medicine of Padova, where he had as teachers, among others, Achille De Giovanni and Edoardo Bassini. In 1889 he graduated and shortly after he went to Paris where he attended specialized courses to learn qualified notions in the new medical-surgical branch, otolaryngology, then almost ignored in Italy; he had the opportunity to listen to the lessons of distinguished masters such as J.M. Charcot, J.E. Pean, E. Roux. Then in 1914 in Freiburg at the school of Kahler and Brunings. In a few years Yerwant became an important figure in Padua: just before the first Mondial war he opened an ENT private clinic in Padua (Fig 4) and became a member of the city council and vice-president of the town savings bank, just in the early 1920s.

Otorhinolaryngology began in Veneto at the same time in Padova and Venezia: in these two cities the specialty was born, first of all, as a need for assistance and only later as a teaching for medical students.

Yerwant came back to Padova in 1898, where he obtained the first teaching; in 1900 he began, in a simple room of the civil hospital, the specialist consultancy for ear, nose and throat diseases. The Otolaryngology department was established later and was entrusted with the management; he then received the assignment of teaching otolaryngology which, for some years, he shared with prof. Federico Brunetti: prof. Brunetti held theoretical teaching (1923-1935) and prof. Yerwant Arslan, the clinical-practical one (1924-1935).

Yerwant Arslan was one of the pioneers of nasal septal surgery and laryngeal tracheal stenosis; in the wake of Kirsten and Killian he established a real specialized center for tracheo-bronchoscopic techniques; in otology, new surgical techniques such as attical-an-trectomy and ossiculotomy through the canal are widespread. In 1938 his son Michele took over the management of the Department. He died in Padova on May 21, 1948.



Figure 3 Arslan family: Yetwart (older brother of Khayël); Zareh Arslanian, (doctor in Aleppo and half-brother of Yerwant), Yerwant, Khayël; sitting in front: Yerwant's wife Antonietta de' Besi Vitturi, Enrica-Henriette, and Alis, Zareh's wife.
(By courtesy of Antonia Arslan)



Figure 4 Yerwant Arslan's ENT private clinic in Padova around 1910, advertising card. (By courtesy of Antonia Arslan)

Khayël (then Michele) Arslan, Yerwant's son, succeeded his father in the direction of the ENT department, in 1938 at the age of 34, with the title of "Director in Charge".

Michele (Khayël) Arslan was born in 1904 and he graduated in Padova in 1927; during his studies he was a student of the pathological institute directed by prof. Cagnetto, with masters such as Terni and Ducceschi. In the first years of his degree he went to Strasbourg (prof. Canuyt), Frankfurt (Prof. Otto Voss and prof. Grahe) and Berlin (with Prof. Fisher, director of the Institute of Physiology and Carl von Eicken), where he carried out studies and research on vestibular physiology. In 1938 Khayël/Michele Arslan took over the management of the ENT Department. In 1943, prof. Michele Arslan established, together with prof. Carlo Tagliavini, director of the Institute of Glottology of the University of Padova, the Phonetics Laboratory of the University of Padova, located inside the hospital (with Luigi Cojazzi and Alberto Delaini). (Figure 5 a,b,c).

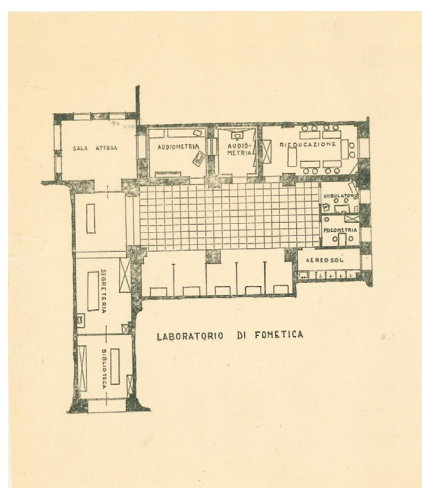
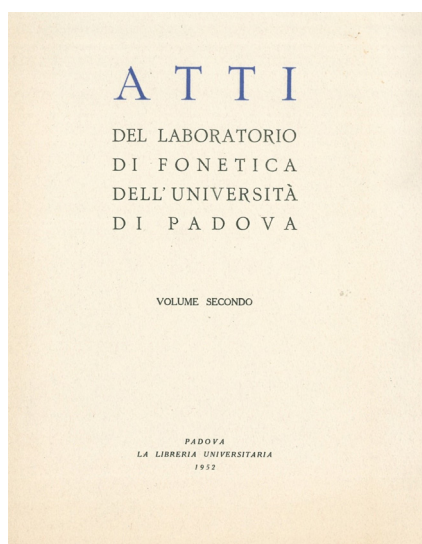
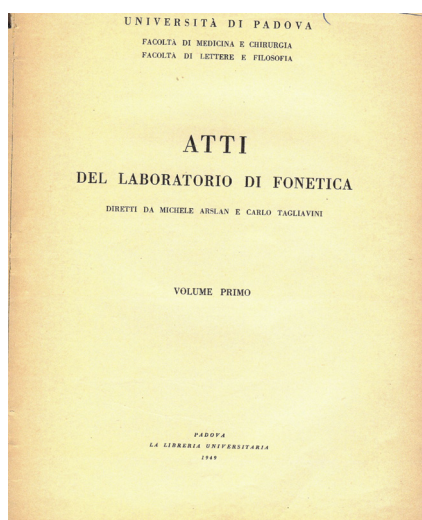


Figure 5a, b, c Proceedings of the Phonetics Laboratory of the University of Padova vol. 1 (a), vol. 2 (b) and lab map (c). (By courtesy of Mario Rossi)

This is the first, and the only one in Italy, creation of an interdisciplinary university structure combining biological-medical skills with linguistic skills which as M. Arslan wrote in the preface to the 1st volume of the Proceedings of the Phonetics Laboratory of the University of Padova (1949) were “aimed at bringing together speculations and experimentations directly” of the aforementioned disciplines.

The Phonetics Laboratory performed clinical counselling for the Institute of Deaf-Mutes "Pia Foundation Elena Vendramin Calergi Valmarana" in Noventa Padovana (Padova), which had begun its activity in 1909 (Fig 6). Thus, was born in Padova the modern Phoniatrics, that will have among its most prominent names Lucio Croatto, Gino Baldan, Mario Rossi.

In 1974, the Medical Faculty of Padua called to succeed him in the Chair and in the direction of the Institute, prof. Oscar Sala, his pupil and holder of the second chair in the branch in Verona.



Figure 6 Hearing rehabilitation at the Institute of Deaf-Mutes "Pia Foundation Elena Vendramin Calergi Valmarana" in Noventa Padovana, around 1948.
(By courtesy of Mario Rossi)

From the very beginning, the Padova School presented itself above all as Otology/Vestibology and Audiology/Phoniatrics with particular interest in the rehabilitation of children with profound hearing loss. In a 1939 report

dedicated to his father Khayël, Arslan described the activity of the Otorhinolaryngology Department of "Regia Università di Padova-Ospedale Civile di Padova" for the period from 1935 to 1938.¹

The school was immediately characterized by a marked international participation, quite remarkable for those times. Khayël / Michele Arslan's training takes place in Europe: Paris, Strasbourg, Frankfurt, Berlin...



Figure 7 X World Congress of Otorhinolaryngology, Venice 1973: Arslan speech (a)

Arslan with Marchiori (on his right), Cojazzi and Colletti, (b). (By courtesy of Paola Arslan)

Therefore, international activity led to Padova the 4th Congress of the "Société Internationale d'Audiologie" in 1958, the Collegium Oto-Rhino-Laryngologicum Amicitiae Sacrum meeting in 1960 and the X World Congress of Otorhinolaryngology was held in Venice in 1973. (Fig 7a, b)

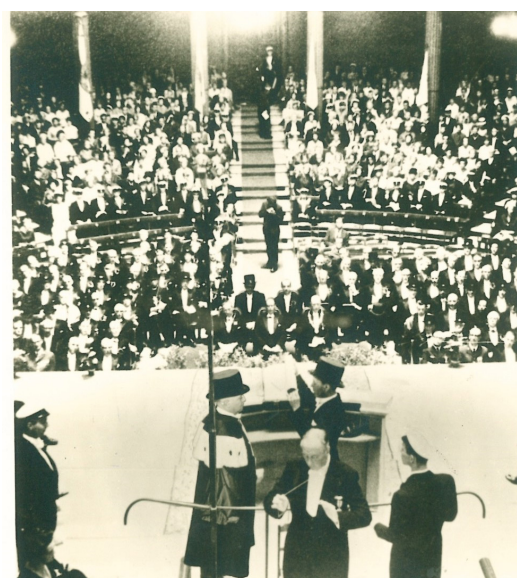


Figure 8 Arslan Laurea hc in Uppsala 1956. (By courtesy of Paola Arslan)



Figure 9 Award of CRS Amplifon, 1979, Arslan and Bocca. (By courtesy of Paola Arslan)

¹ The direction of the Institute was entrusted as the holder of the official teaching of the Otorhinolaryngology Clinic designated by the "Regia Università" by decree of March 4, 1933, by ministerial provision following an agreement between the Ministry of National Education and the Ministry of the Interior. The otolaryngology department had "61 beds and modest clinical and scientific equipment only sufficient for some sectors". This report highlights how the number of hospitalized patients has gone from 514 (1929-1930) to 1554 (1937-1938). The type of surgical activity was interesting, mainly focused on otological surgery with about 500 interventions in the 3 years (including almost 300 total mastoidectomies also with lateral sinus incision, lacing of the internal jugular and dura), and, in addition to nose surgery and of the paranasal sinuses, of the neck (including total and partial laryngectomies), to an activity on the trachea / bronchi and esophagus that characterized the Padova Clinic for all subsequent decades.

Prof Michele Arslan received important international awards such as the Legion d'Honneur Française, the honorary degree "laurea honoris causa" from Uppsala 1956 (Fig 8) and Strasbourg 1970 and also the Marzotto and CRS Amplifon International prizes (Fig 9). He was also a full member of the Aerospace Technical Committee of the European Council.

The "Proceedings" of the clinic were published in international journals (e.g. Journal Français d'Oto-Rhino-Laryngologie et de Chirurgie Maxillo-Faciale vol 6 1957).



Figure 10 George von Békésy "laurea honoris causa" Padova 1962. (By courtesy of Paola Arslan)

During the International Symposium on Ménière disease, organized in Padua by prof. Arslan, George von Békésy, who the year before had received the Nobel Prize for Medicine, was awarded the "laurea honoris causa" in Medicine of Padua University. (Fig 10)

Numerous are the contributions and citations of Prof. Arslan and co-workers in international treaties.²

Two particularly important figures emerged subsequently: Lucio Croatto (Fig 11) and Oscar Sala (Fig 12); after that Andrea Bosatra, Vincenzo Ricci, Davide Megighian, Giorgio Molinari, Gregorio Babighian.



Figure 11 Lucio Croatto. (By courtesy of Donatella Croatto)



Figure 12 Oscar Sala speaking to pediatricians in Belluno in 1955. (By courtesy of Annalisa Sala)

Another group was more interested in the oncological aspects of the specialty (Gastone Pesavento, Italo Serafini, Franco Polidoro, Carlo Marchiori, Alfio Ferlito).³

² Wolfson RJ (ed): The vestibular system and its diseases, Philadelphia University of Pennsylvania Press 1963; Stahle J (ed): Vestibular function on earth and in space. Pergamon Press Belfast 197; Megighian D, Electronistagmography. Minerva Otorinolaringol. 1959, 395 in JH Toggia Electronystagmography, Charles C Thomas Publisher, Springfield 1976; Bosatra A. Current trends in English otolaryngology (impressions after a stay of six months) Minerva Otorinolaringol. 1956 Jul-Aug; 6 (4): 227-30.

³ Hospital ENT department Heads: Alberto Ancetti (Monselice); Gino Baldan (Dolo); Vittorio Boetner (Gorizia/

Prof Oscar Sala took over the direction of the ENT Clinic in 1974, followed by Carlo Marchiori, Alberto Staffieri, Alessandro Martini and Piero Nicolai. Edoardo Arslan (1945-2013) took over the direction of the Audiology-Phoniatric service in 1990. (Fig 13)



Figure 13 Edoardo Arslan

One of Prof Arslan's passions was history. He wrote about the diseases of great writers such as Marcel Proust, Franz Kafka and Thomas Mann, and his contributions and those of his collaborators in particular on the anatomi-

mists of the Studium Patavinum were important.⁴ In particular, Arslan claimed in favour of the Paduan anatomist Giulio Casserio the discovery of the vestibular apparatus on the pike fish in 1609, that is, around three centuries before Retzius, to whom it is usually attributed (10). In his work *"Sull'amicizia tra Galileo Galilei e Fabrizio d'Acquapendente"* (1966), he wrote with big emphasis about the "friendship" between Fabrizio, nearly sixty, and Galilei when he arrived in Padova.⁵

Vestibology

The interest of prof. Arslan for vestibology was born when, as an internal student, he worked alongside prof. Aristide Stefani, neurophysiologist and great scholar of vestibular physiology,⁶ and especially during his internships in Strasbourg, Frankfurt, and Berlin where he attended in addition to the clinical departments, the Institutes of Physiology.

The interest of the Padova school for vestibular problems and in particular for physiology and pathophysiology of the vestibular apparatus, clearly emerges from a publication of 1949,⁷ in which 103 papers published between 1928 and 1948 by the Padova school

Venezia); Bruno Bonandini (Adria); Giovanni Bottura (Pordenone); F. Buffa (Asmara); Michele Carbone (Feltre/Schio); Mario Casatta (Tolmezzo); Furio Cavazzani (Vicenza); Pietro Cenzi (Castelfranco Veneto); Luigi Cojazzi (Udine); Italo Faggian (Legnago); Alberto della Frattina (Pieve di Sacco/Padova); Giambattista de Stefani (Rovigo); Gianni De Vido (Treviso); Alessandro Fioretti (Ancona); Domenico Gabrielli (Belluno); Giorgio Gasparini (Cittadella); Giuseppe Gasparini (Bassano); Federico Giacomelli (Camposampiero); Emilio Malossini (Rovereto); Giuseppe Martini (Este); Gastone Pesavento (Vicenza); Gastone Pivotti (Mestre); Attilio Pozzan (Mirano); Franco Polidoro (Este/Cittadella); Graziano Pretto (San Giovanni Rotondo); Enrico Rubaltelli (Rovigo); Italo Serafini (Vittorio Veneto); Riccardo Saetti (Feltre/Belluno); Alessandro Veronese (Portogruaro/Sandonà).

⁴ Arslan M. [Marcel Proust and his allergy]. *Marg Otolaryngol.* 1950 Nov;6(4):528-31.

Bosatra A. [The ear in the studies of Antonio Molinetti, Paduan anatomist of the seventeenth century]. *Minerva Otorinolaringol.* 1954 Mar-Apr;4(2):99-102.

Bosatra A, La "Nova auris intemae delineatio" di Cecilio Folli, in *Acta medicae historiae Patavina*, I (1954-55), pp. 1-16

Bosatra A, Candiani V. [Notes and comments on Alessandro Benedetti, anatomist and physician of the Paduan Atheneum of the 15th century, with special reference to rhinoplasty]. *Minerva Med.* 1955 Jul 7;46(54):30-5.

Fioretti A, Concato C. Problemi di storia dell'anatomia dell'orecchio. Polemiche cinquecentesche intorno alla scoperta della staffa. *Acta Medicae Historiae Patavinae*, 1957

Arslan M. [Marcel Proust and sensory phenomena]. *Rev Laryngol Otol Rhinol (Bord)*. 1958 Nov;79(Supp):799-805.

Arslan M. Les grandes découvertes dans l'oreille et dans le larynx par les anatomistes de l'Université de Padoue du XVI^e siècle. *Acta Oto-Laryngol.* 53 1961 Mar-Apr; 53:97-102.

Arslan M. Gli anatomici padovani del '500 e le scoperte degli organi di senso. *Atti e Memorie dell'Accademia Patavina di Scienze, Lettere ed Arti*, vol XCI, Società Cooperativa Tipografica, Padova 1966

Arslan M. La scoperta dell'apparato vestibolare è dovuta a J. Casserio (1609). *Nuovo Archivio Italiano di Otologia, Rinologia e Laringologia*, vol VII: 305-312, 1979

Arslan M. Il linguaggio degli animali (traduzione italiana) Girolamo Fabrizio d'Acquapendente. Centro stampa Palazzo Maldura, Padova 1982

⁵ Arslan M. Sull'amicizia tra Galileo Galilei e Fabrizio d'Acquapendente. "Scritti e discorsi nel IV Centenario della nascita di Galileo Galilei", 123-128, Società Cooperativa Tipografica, Padova

⁶ Megighian A, Reggiani C. Ewald's role among the pioneers of otoneurology. *HBC* 1-5, vol 19,2021

⁷ Arslan M., Studies of physiology and pathophysiology of the vestibular apparatus: 1928-1948. Padua 1949, Società Cooperativa Tipografica

are reported (Fig 14). The work, also published in English, divides the different papers by topics: methodology, physiology of the vestibular apparatus, vestibular apparatus and the vegetative nervous system, pharmacology of the vestibular apparatus, semeiology, pathology of the vestibular apparatus.

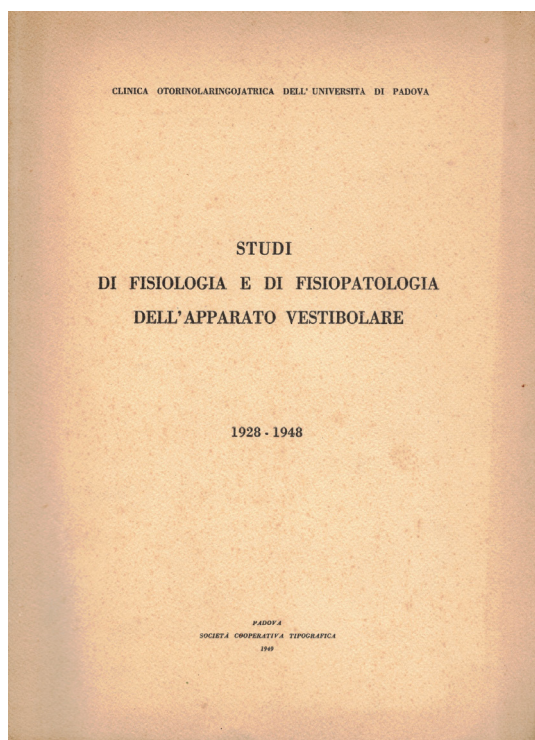


Figure 14 Arslan M., *Studies of physiology and pathophysiology of the vestibular apparatus: 1928-1948.*

Padova school was very active in the "Réunion des Oto-Neuro-Ophtalmologues de la Suisse romande" since 1941, a parallel to those of the "Sociétés d'ONO de langue française" and the "Società Italiana di Oto-Neuro-Oftalmologia".⁸

In 1956 the Official Report to the national congress held in Bologna "Fisiopatologia e clinica delle vie vestibolari centrali", an "electronystagmographic" apparatus for the study of nystagmus was described, built by dr. G. Pivotti and ing. A. Lucarelli and used in particular by Davide Megighian (Fig 15 and 16 a,b).

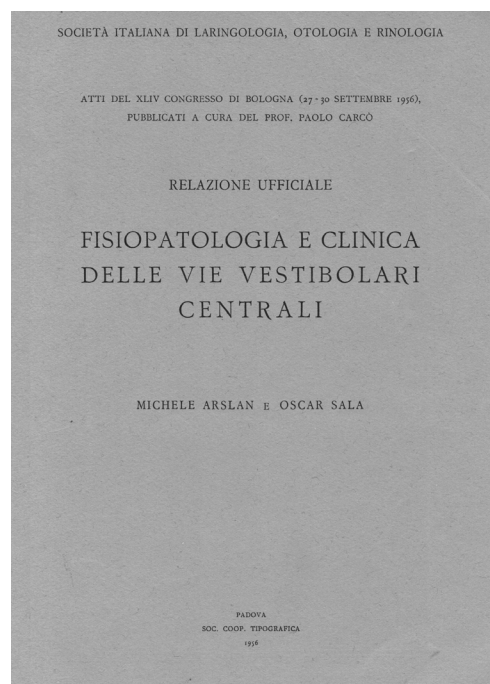


Figure 15 Arslan M, Sala O. "Fisiopatologia e clinica delle vie vestibolari centrali" Official proceedings XLIV National Congress of the "Società Italiana di Laringologia, Otologia e Rinologia", Bologna 27-30 settembre 1956, Padova Società Coop. Tipografica 1956

One of the main aspects of vestibular research was on the standardization of methods for analysing vestibular function;⁹ another very important aspect were the studies on Ménière's disease¹⁰ and on the vestibular

⁸ Groupe des Oto-Neuro- Ophtalmologistes et Neuro-Chirurgiens de la Suisse Romande 11^e Assemblée annuelle à Stresa les 15 et 16 septembre 1951 en commun avec la Société italiana di Oto-Neuro-Oftalmologia: L'apporto interpretativo dei fenomeni bioelettrici a problemi di fisiologia vestibolare per O. SALA (Padova)

⁹ Arslan M, Cambrelin G, Crabbe F, Hallpike Cs, Portmann G, Van Egmond Aa. Rev Laryngol Otol Rhinol (Bord). [Standardization and simplification of techniques for the examination of the vestibular apparatus]. 1951 May;72(Suppl):290-7.

Arslan M. Harefuah. The necessity of standardizing methods of examining the excitability of the vestibular apparatus. 1952 Oct 15;43(7-8):102-4.

Arslan M. On the renewing of the methodology for the stimulation of the vestibular apparatus. A discussion with clinical aims. Acta Oto-Laryngologica, Stockholm 1955 Suppl. 1955;122:1-97.

¹⁰ Arslan M. [Direct application of ultrasound to the osseous labyrinth for therapy of labyrinthosis (Menière's disease)]. HNO. 1953-1954;4(6):166-8.

Arslan M. [Mechanism of onset of attack of vertigo in Meniere's disease]. Minerva Otorinolaringol. 1953 Mar-Apr;3(2):54.

Arslan M. [Direct application of ultrasonics on the osseous labyrinth in treatment of labyrinthosis]. Minerva

function in space flights.¹¹ A "Laboratory of Biophysics and Physiology of the Vestibular Apparatus" was established in the ENT Clinic in Padova (Fig 16 a,b).



Figure 16 a,b Laboratory of Biophysics and Physiology of the Vestibular Apparatus in Padova

Audiology & Phoniatrics

Another interest of the Padua school from the very beginning was the study of the causes and the rehabilitative aspects of childhood profound deafness¹² including the phoniatric

Otorinolaringol. 1953 Jul-Aug;3(4):141-55.

Arslan M. Ultrasonic surgery of the labyrinth in patients with Ménière's syndrome. *Sci Med Ital.* 1958 Oct-Dec;7(2):301-26.

Arslan M. Origin of the nystagmus arising during and after ultrasonic destructive irradiation of the vestibular apparatus. *Acta Otolaryngol Suppl.* 1963;192: SUPPL 192:121+.

Arslan M. Ultrasonic destruction of the vestibular receptors in severe Ménière's disease. *Laryngoscope.* 1964 Sep; 74:1262-82.

Arslan M. Modifications of the osmotic pressure of perilymph and endolymph. An hypothesis on the pathogenesis of Ménière's disease. *Acta Otolaryngol.* 1969 Feb-Mar;67(2):360-77.

Arslan M. A new hypothesis on the plurifactorial etiology of Ménière's disease. *Acta Otolaryngol Suppl.* 1977; 357:1-19.

Arslan M. Choice of surgical procedure in Ménière's disease. Proposal for a new osmotic 'induction' method. *J Laryngol Otol.* 1970 Feb;84(2):131-47.

Arslan M. A new hypothesis on the plurifactorial etiology of Meniere's disease. *Acta Otolaryngol Suppl.* 1977; 357:1-19.

¹¹ Arslan M, Martini A, Razzolini R. [Coriolis acceleration. Vestibulo-vegetative stimulations with regard to the motion sickness of astronauts. Experimental researches]. *Minerva Med.* 1976 Jul 28;67(36):2347-9.

Martini A. [Considerations for a phylogenetic and modelling analysis of the semicircular canals]. *Ann Laringol Otol Rinol Faringol.* 1978;76(5-6):455-66.

Arslan M, Martini A, Razzolini R, Blezza F Accelerazioni endolinfatiche di Coriolis quali cause di fenomeni patologici (Space Sickness). *Calcolo fisico dell'effetto Coriolis*. Scienza e Cultura, pp9-17, Edizioni Universitarie Patavine, Padova 1979

Megighian D, Martini A. Motion sickness and space sickness: clinical and experimental findings. *ORL J Otorhinolaryngol Relat Spec.* 1980;42(4):185-95.

¹² Martini G. Le alterazioni della funzione vestibolare in cento bambini sordomuti. *Atti Laboratorio di Fonetica dell'Università di Padova.* Vol.1: 5-22, 1949

De Vido G, De Stefani Gb. Considerazioni sulla sordità congenita ereditaria apparentemente legata al sesso. [Considerations on congenital hereditary deafness apparently tied to sex]. *Acta Genet Med Gemellol (Roma).* 1952 Sep;1(3):294-306.

Cojazzi L, Comoretto R. [Activity of the center for study and re-education of speech and hearing]. *Friuli Med.* 1953 Jul-Aug;8(4):335-9.

Bosatra A. l'embriopatia rubeolica. Sua importanza come causa di sordità congenita. *Minerva Otorinolaringologica,* 4:3-20, 1954

Bocca E., Croatto L. Dilsalie Audiogene. Relazione ufficiale III congresso Nazionale Società di Fonetica Sperimentale, Fonetica Biologica, Foniatria e Audiologia. Torino 6-7 novembre 1954. Società Cooperativa Topografica, Padova 1954 (Fig 19)

Sala O. La terapia medica della sordità. Relazione al Raduno Internazionale di Audiologia. Montecatini-Terre 10-12

aspects of cleft lip and palate¹³ and medical-legal issues in Otology.¹⁴

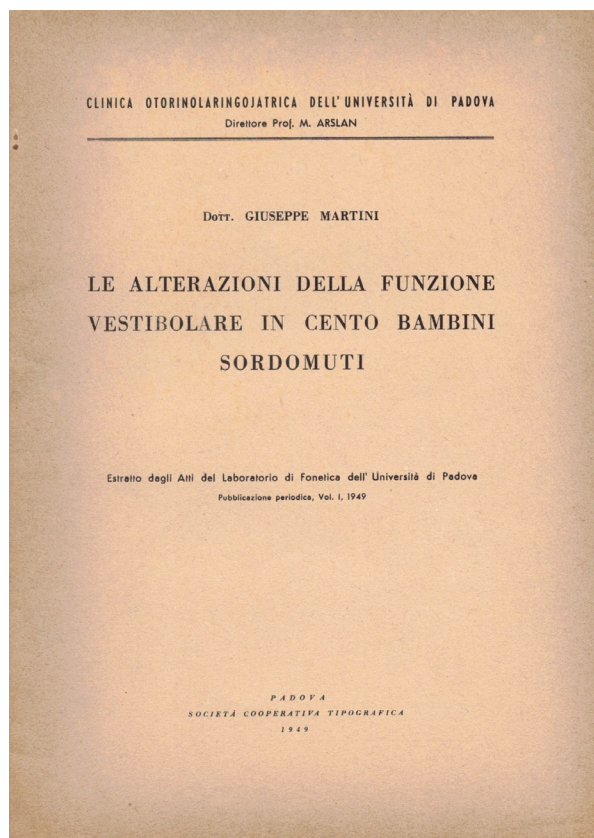


Figure 17 paper on Vestibular function in one hundred profound children published in 1949

Of particular interest and noteworthy is a paper published in 1949 by Giuseppe Martini in which it was reported that one hundred deaf-mutes children with congenital and early acquired deafness underwent a complete

vestibular involvement (Fig 17). De Vido and De' Stefani discussed the congenital hereditary deafness apparently tied to sex in a 1952 paper (Fig 18).

Lucio Croatto presented with Ettore Bocca the official report on speech problems in hard of hearing children at the national congress of Audiology and Phoniatrics in Turin (1954).

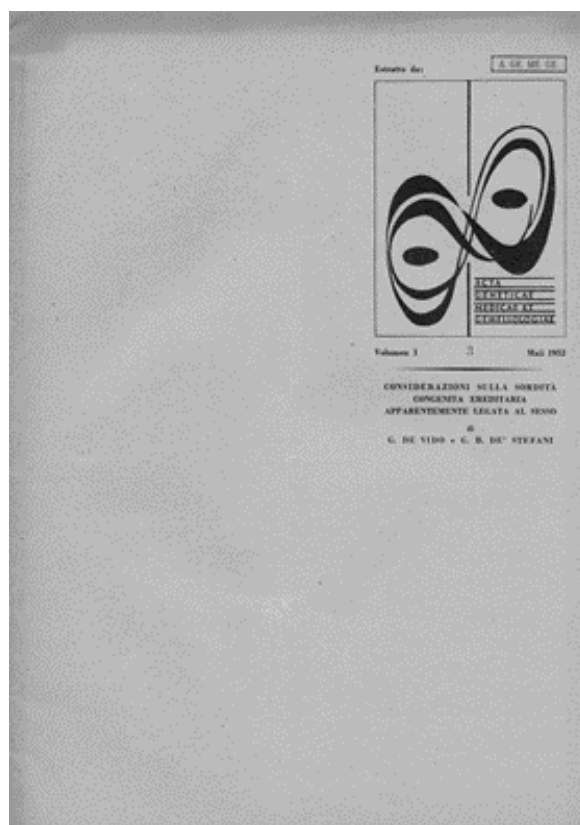


Figure 18 paper about congenital deafness apparently linked to the sex, published in 1952

maggio 1956. "Atti della Clinica Otorinolaringoiatrica" dell'Università di Padova. Vol. 15-45. Società Cooperativa Topografica, Padova 1956

Bosatira A. [Adaptation phenomenon and its relation to other liminal and subliminal audiometric tests]. Arch Ital Otol Rinol Laringol. 1957 Nov-Dec;68(6):946-64.

Bosatira A. il problema del mascheramento nello studio della conduzione ossea. Proposta di un nuovo metodo d'esame. Rivista di Audiologia Pratica nn7-8-9: 1957

¹³ Croatto L. [Phonetic assistance after palatosynthesis operations]. Boll Soc Med Chir Modena. 1950;4(3): clii-clv.

Croatto L, Croatto-Martinolli C. [Physiopathology of the soft palate]. Folia Phoniatr (Basel). 1959;11(1-3):124-66.

Croatto L. [Intervention for doubling the posterior wall of the pharynx as a complement to restorative surgery of the palate in velar insufficiency]. Aktuel Probl Phoniatr Logop. 1960; 1:55-63.

Croatto L, Accordi M, Croatto-Martinolli C, Feltrin GP, Magno-Caldognetto E, Sacerdote G, Bordone-Sacerdote C, Schindler O. Studio Rontencunematografico, elettroacustico ed informativo del linguaggio verbale della Lingua Italiana. Relazione Ufficiale XI Congr. Naz. Società Italiana di Audiologia e Foniatria, Torino 1971, Bollettino di Audiologia e Foniatria 1971

¹⁴ Arslan M, Canuto G, Porta CF. Problemi di Medicina Legale ed infortunistica in Otologia. Relazione Gruppo ORL Alta Italia, Padova 8 dicembre 1953. Scuola Tipografica Bendettina, Parma 1953 (Fig 20)

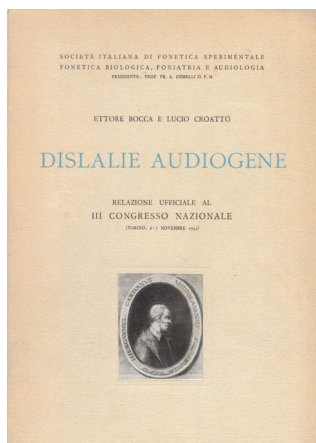


Figure 19 Bocca E., Croatto L. Dislalie Audiogene. Relazione ufficiale III congresso Nazionale Società Italiana di Fonetica Sperimentale, Fonetica Biologica, Foniatria e Audiologia. Torino 6-7 novembre 1954.

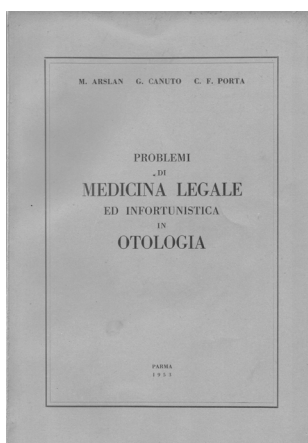


Figure 20 Arslan M, Canuto G, Porta CF. Problemi di Medicina Legale ed infortunistica in Otolologia. Relazione Gruppo ORL Alta Italia, Padova 8 dicembre 1953.

Experimental research, in particular on innervation and vascularization of the inner ear were carried out.¹⁵

As evidence of this interest in Audiology there is a graduate thesis of 1929 on the "Practical value of acoustic functional examination in the diagnosis of ear diseases" (grad student Antonio Cortellini Rossi, Mario Rossi's father, who later became a phoniatician at the Padova clinic) had Khayël Arslan and Enrico Rubaltelli as supervisors (Fig 21).

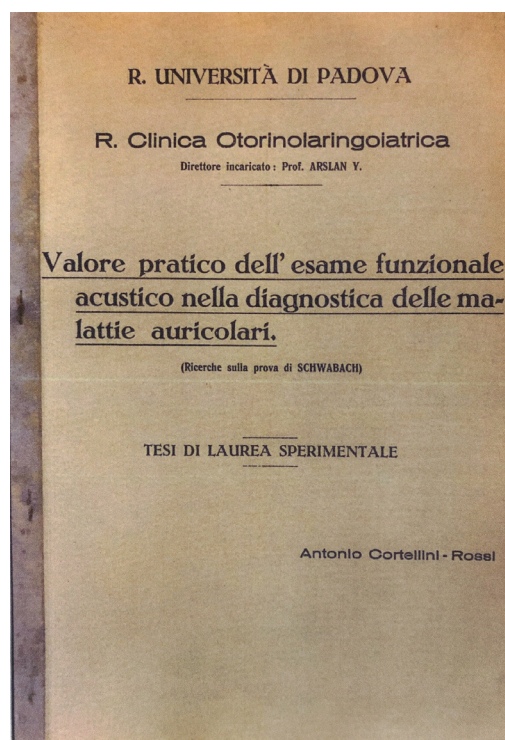


Figure 21 graduate thesis of 1929 on the "Practical value of acoustic functional examination in the diagnosis of ear diseases". (by courtesy of Mario Rossi)

¹⁵ Bolletti M, De Vido G. [Streptomycin toxicity in children with special reference to cochleo-vestibular damages]. Acta Paediatr Lat. 1952 Jan-Feb;5(1):1-30.
 Botner V, Pivotti G. [Arterial relations between inner and middle ear in dogs and guinea pigs]. Arch Ital Otol Rinol Laringol. 1954 Nov-Dec;65(6):786-801.
 Botner V, Comoretto R. [Experimental research on the relations between iridodilating nerve fibers and the middle ear in various mammals]. Minerva Otorinolaringol. 1956 Jan-Feb;6(1):5-10.
 Botner V, De Stefani Gb. [Innervation of the auditory artery; research on microscopic anatomy in the dog]. Arch Ital Otol Rinol Laringol. 1956 Jan-Feb;67(1):6-23.
 Botner V. [Innervation of the middle ear in human embryo]. Arch Ital Otol Rinol Laringol. 1956 Mar-Apr;67(2):177-206.
 Botner V, Ancetti A. [Histomorphology of the human tympanic ganglia]. Minerva Otorinolaringol. 1956 Mar-Apr;6(2):106-9.
 Bosatra A. Some observations on the vascularization of the VIIth nerve. J Laryngol Otol. 1956 Nov;70(11):605-13.
 Bosatra A. [Blood flow regulation mechanisms at the origin of the internal auditory artery in humans]. Arch Ital Otol Rinol Laringol. 1957 Jan-Feb;68(1):12-25.
 Arslan M. Sensory Organs Angiology, Acta International Symposium, Padova 8-9 June 1963, Acta Angiologica, Santoriana Varese 1964

Teaching ability was one of the characteristics of prof. Arslan who always loved to bring "clinical" cases to class to make students understand the pathological picture from time to time of the lesson topic. Prof. Arslan was used to give the last lesson of the Otorhinolaryngology course for students of the Medical School, at the Institute of Deaf-Mutes "Pia Foundation Elena Vendramin Calergi Valmarana"; for this reason, all the physicians graduated at Padova Medical School, had a real information regarding the problem of deafness (Fig 22).



Figure 22 Last lesson Arslan of the Otorhinolaryngology course for students of the Medical School, at the Institute of Deaf-Mutes "Pia Foundation Elena Vendramin Calergi Valmarana", 1956/1964. (By courtesy of Paola Arslan)

Research in the audiological field was above all on the causes of childhood deafness and on rehabilitation methods, and on medical as well as surgical treatment of deafness.

This interest continued in the following decades and the Padova school gave important contributions in particular in the field of the genetic causes of deafness (with the organization of the European projects HEAR and GenDeaf up to the presence in the scientific committee of the ERN CRANIO, Craniofacial

anomalies and ear, nose and throat disorders) and in Cochlear Implants.¹⁶

Prof Arslan was one of the first to understand the great possibilities for hearing rehabilitation of Cochlear Implants (see in Fig 23 his meeting with William Bill House, a pioneer in the field of cochlear implants, in Los Angeles in 1964).



Figure 23 Prof Arslan with William House in Los Angeles 1964. (By courtesy of Paola Arslan)

Padova & Venezia partnership

It should not be forgotten the Otorhinolaryngology dept in Venice that developed parallel to that of Padova.

Faustino Brunetti (1854-1946), one of the founders of the Italian Society of ENT in 1881, was head of the Otolaryngology department. Contemporary to Brunetti, Ferruccio Patuelli (1959-1929) who in the tradition of the time attended the European ENT clinics (in particular he was a student of Politzer and Chiari in Vienna). A particularly important role has been played by Ferruccio (1884-1972), Faustino Brunetti' son, head of ENT at the SS. Giovanni e Paolo and, in the period 1923-

¹⁶ Martini A., Read A., Stephens D. (eds.). Genetics and Hearing Impairments, Whurr, London, 1996
 Stephens D., Read A., Martini A. Developments in Genetic Hearing Impairment. Whurr, London. 1998
 Martini A., Mazzoli M., Read A., Stephens D. Definitions and Guidelines in Genetic Hearing Impairment. Whurr, London, 2001
 Stephens D and Jones L. the impact of genetic hearing impairment, Whurr London. 2005
 Martini A., Stephens D., Read A.P. Genes, Hearing and Deafness. From Molecular Biology to Clinical Practice. Informa, London, 2007
 Martini A, Cassina M. Genetic of hearing loss, special issue Audiology Research, 2021

1935, in charge of the Otorhinolaryngology course at the University of Padua.

The Venice Department was very active from a scientific and technological point of view.¹⁷ Francesco Benciolini worked with Brunetti in Venice until 1938 (then from 1953 head of the ENT division at the Verona hospital institutes) (Figure 24)



Figure 24 The new operating room operating light in Venice ENT department 1931 1964. (By courtesy of Paolo Benciolini)

Faustino Brunetti, the son of Ferruccio, was born in Venice and he graduated in Padova in 1934. After graduation he moved to Turin, where he took up the position of teaching in 1948 and then director of the Clinic in 1956, in the chair that had once been of another great Venetian, Giuseppe Gradenigo (1859-1926). Gradenigo published in 1921 a particularly interesting monography on "la Surdit  Familiale" which is one of the first contribution to this important and current topic. (Fig 25)

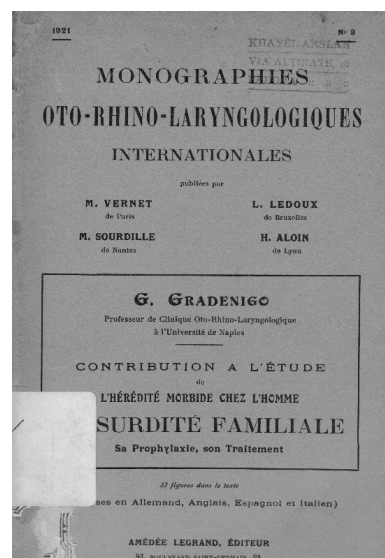


Figure 25 Giuseppe Gradenigo "la Surdit  Familiale" 1921



Prof Antonio Antonelli celebrates prof Michele Arslan at the meeting on Paediatric Otorhinolaryngology in Sirmione, September 23, 2017

¹⁷ Gradenigo G, Brunetti F. Atti XXII Congresso, Societ  Italiana di Laringologia, Otologia e Rinologia, Venezia 10-12 settembre 1925, Tipografia A. Vidotti, Venezia 1925

Benciolini F. Nevrite dell'acustico d'origine differica? Annali Laringol Otol Rinol Faringol, dicembre 1928, fasc 4:313-32. Osp ss Giovanni e Paolo Venezia, diretta prof Federico Brunetti

Benciolini F. Meningoencefalite acuta emorragica in corso di otomastoidite influenzale bilaterale Rivv Oto-Neuro-Oftalmologica 8:3.11, 1931

Brunetti F. Interventi sull'orecchio, sulla mastoide, sulle fosse nasali, sui seni paranasali, sulla faringe e sulla trachea. In Dogliotti AM, Trattato di Tecnica Operativa. Vol II, parte 1 , pp 278-411, Torino 1948

Brunetti F. [Personal report on forty years of experiences in otorhinolaryngology]. Minerva Med. 1954 Apr 7;45(28):968-75.

Cerciello P. Reperti vestibolari nelle sordit  percettive dell'infanzia [vestibular findings in perceptive deafness in childhood]. G Veneto Sci Med. 1963 Nov-Dec;18: 419-54.