

THE CITADEL

History of Italian Orthodontics



1976 - 2016
40°

Editors

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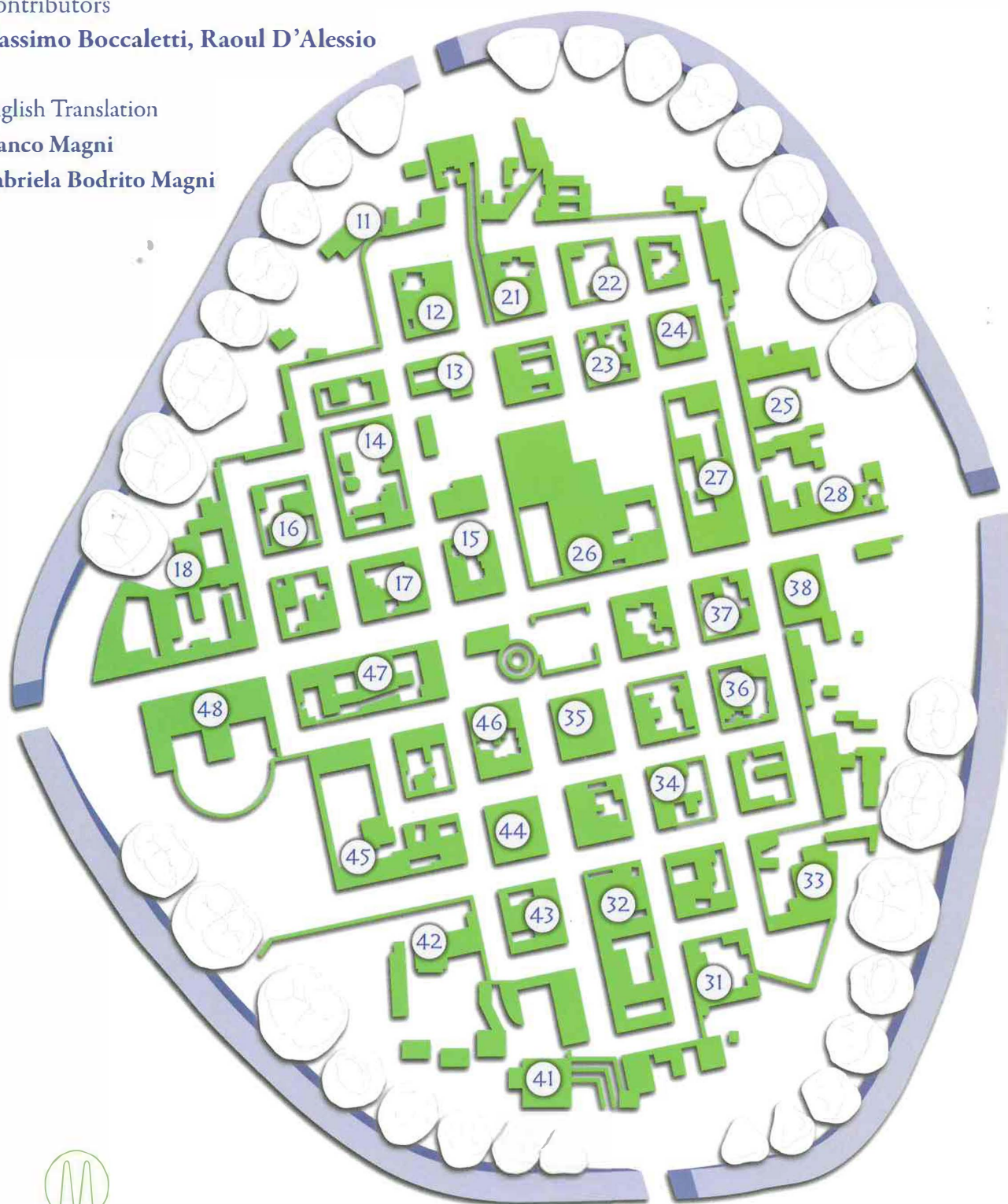
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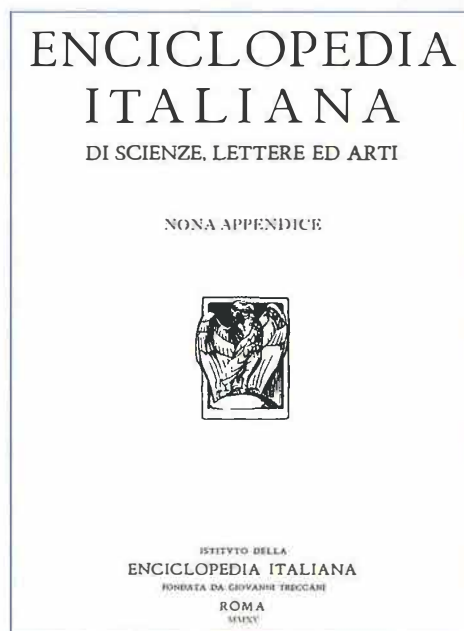
The word “Orthodontics” appears finally in the Italian Encyclopaedia Treccani

Raoul D'Alessio, Roberto Deli

Going through the Italian history of Orthodontics, it's convenient to listen to Raoul D'Alessio's (pic. 1) comment on the word Orthodontics recalled in the "Ninth Appendix of the Italian Treccani Encyclopaedia" of Science, Language and Arts published in 2015 (pics. 2, 3, 4, 5, 6). The word "Ortodonzia" was mentioned for the first time with all the dignity it deserves.



Picture 1.
Raoul D'Alessio.



Picture 2.
"Ninth appendix of Treccani Italian Encyclopaedia" of Sciences, Letters and Arts published in 2015.

As a result of the in-depth analysis carried out at the end of the past "Millennium", our research took advantage of the cooperation of Prof. Carl Misch (University of Pittsburg, USA) dealing with the relationship among natural beauty norms and tooth agenesis aesthetically affecting face and smile, focusing extensively on anterior sectors.

Only a few years later during my presidency of CRON-OM (National Institute of Orthodontics Research - Maxillary Orthopaedics) through the cooperation of the Universities of Aquila and Trieste, we carried on further researches on the: "Guidelines on female face and smile Aesthetics" officially presented at the Paris Dental World Conference (2004). That research was pursued for a two-year period (2006-2007) with SIDO during Alberto Laino's presidency, availing ourselves of the precious and fundamental scientific expertise of Prof. Chiarella Sforza (University of Milan, Human Morphology Dept.) an international expert about facial tridimensional morphometric analysis.

ORTHODONTICS. – CRANIOFACIAL MORPHOSTRUCTURE. MORPHO-STRUCTURE OF THE FACE. GNATHOLOGY. POSTURE AND OCCLUSION. ORTHODONTIC THERAPY IN A STRICT SENSE. Bibliography.

O. (also known as *orthodontia*) concerns the aesthetic and functional rehabilitation of the dental arches in respect of the temporomandibular joints, gingival tissue and the masticatory, phonatory and deglutition functions. To this end, it avails of various devices, both mobile and fixed, to create an alignment that is consistent with the individual functions of the teeth and dental arches. The earliest orthodontic appliances date back to the 19th century. As of 2015, thanks to its evolution, the discipline availed of new technologies and material sciences, meaning the current orthodontic treatments, provided by experts in the field, resulted in rapid and minimally-invasive outcomes for the patient. The principal difficulty of O. is therapeutic planning, which in turn derives from a careful study of the patient's anthropology, functions and external appearance. It avails of the radiographic study of the craniofacial skeleton and teeth, through orthopantomographic imagery, telerradiography of the skull and *cone-beam* computed tomography. The anthropological assessment of the face is effectuated through traditional photographs in various projections on which parameters of harmony are measured. It is also possible to use tools for 3D stereophotogrammetry that offers a more realistic visualisation and, through sophisticated software, to measure, overlap or duplicate the face and its segments. The study of dental arches can also be performed with 3D cameras, along with the use of traditional plaster models. Even with the help of these modern means, the anthropometric study of the face and with it, the diagnosis of malocclusion require a complex intellectual process for which, with good reason, O. is considered the most 'medical' branch of dentistry. The need for knowledge of biological mechanisms, the science of materials and pathologies means that there are specialisation courses or postgraduate master's degrees to become an Orthodontist.

Craniofacial morphostructural features. – The historic classification (1928) by Edward Hartley Angle spoke of classes I, II and III in terms of the anteroposterior relationship between the jaw and mandible and, more properly, in the first class (normal occlusion) the mesial-vestibular cusp of the maxillary first molar occlude in the central sulcus of the mandibular first molar; in the second class, the mandible is smaller or more disto-positioned than the upper jaw, in which the upper incisors often appear more protruded; conversely in the third class, the lower jaw protrudes and results in the appearance typical of mandibular prognathism (R.E. Moyers, *Handbook of Orthodontics*, 1988).

With the advent of ionising radiation and the spread of cranial latero-lateral radiography, cephalometry was born (Deli, Saccomanno 2010). The study of the relationships between the skull and dental components has employed and continues to employ orthodontists and anthropologists, so as to better identify criteria of normality and more precise indications on the possible orthodontic (or surgical orthodontics) to be performed and on the prediction of growth.

Picture 3.

"Ninth appendix of *Treccani Italian Encyclopaedia*" of Sciences Letters and Arts published in 2015, page 265. Word "Orthodontics".

Many orthodontists have focused their attention on the search for normal cephalometric values, at times without considering individual variations, which are still in biofunctional and aesthetic equilibrium, even if they deviate from absolute values. The studies of Asbjörn Hasund and Olav E. Bøe (*Floating Norms as Guidance for the Position of the Lower Incisors*, "The Angle Orthodontist", 1980, 50, 3, p. 165-68), who developed the idea of *floating norms*, derived from this evolution of the concept of individual normality, as did, subsequently, the research of Alexandre Petrovic, Jean Lavergne and Nicole Gasson, which saw the population being divided into 33 facial types. The intent of the Strasbourg School was to compare skeletal morphology with the genetic potential of each, as genetically determined. It is from this point that the concept of anatomical individuality takes hold, leading to modern O., in which the therapeutic treatment must be adapted to the specific patient.

Morphostructure of the face. – If one of the ultimate objectives of O. is good aesthetics, special attention must also be paid to the soft tissue covering the skeleton. In recent decades, the aesthetics of the face have been the subject of much attention, resulting in numerous analyses being developed, especially in regard to the profile; these include G. William Arnett, Leslie G. Farkas, Reed A. Holdaway, Kurt Wilhelm Butow (Deli, Saccomanno 2010), in respect of contemporary paradigms of facial attractiveness and the ethnicity of patients (Graber, Rakosi, Petrovic 1998; *Orthodontics, Law and Forensic Medicine*, 2012). An original method was also developed, which - by means of an electromagnetic 3D digitizer - allows for the registration of three-dimensional facial coordinates to extrapolate the facial volumes of each human face considered as being attractive both within the norm and as a sample, of both sexes and all ages (children, adolescents and adults, Sforza, Laino, D'Alessio, et al. 2008). Even though such analyses avail of the most advanced mathematical systems and photographic means, their foundation does not differ from the concept of the ancient subdivision in quadrants conceived by Leonardo da Vinci or Albrecht Dürer, whilst also referring to Johannes Kepler's golden ratio or the constant 1.618033989, taken as a unit of measurement.

The latest advance in anthropometry concerns the 3D photogrammetric analysis of the face (Torsello, Mirigliani, D'Alessio, et al., 2010; Deli, Galantucci, Laino, D'Alessio et al., 2013), initiated by the University of Milan, furthered at the Polytechnic University of Bari and completed with highly advanced equipment at the Catholic University of Rome. Conceptually, three-dimensional photogrammetry, in addition to giving a more realistic evaluation of the face itself, offers an examination of the values obtained which, even if not considered in absolute terms, facilitate the creation of a Gaussian distribution within which each individual can be placed. Through this technique, it is possible to detect asymmetries or volumetric defects and to evaluate differences in the soft tissues before and after any treatment. Since 2011, the 'norm' of the Mediterranean female face has also been studied through the examination of the faces of the finalists in the Miss Italy competition (Deli, Di Gioia, Galantucci, et al. 2011).

Gnathology. – This is the sector of O. that studies the functionality of the jaw and temporomandibular joints, or rather the bone, joint, muscles and teeth as a whole. Lack of or deficient functionality overall could cause pathological manifestations

Picture 4.

"Ninth appendix of Treccani Italian Encyclopaedia" of Sciences Letters and Arts published in 2015, page 266. Word "Orthodontics".

of at least one of the components, resulting in pain, discomfort, *clicking* joints, parafunctional habits such as bruxism and clenching, dental abrasions, or even facilitate periodontal disease. The treatment of temporomandibular disorders (TMD) follows many paths: symptomatic therapies such as muscle relaxants, *bites*, orthodontic and prosthetic treatments and psychological behavioural therapies. Also, in this field, the principles of individuality and diagnostic and therapeutic systematics must reign.

Posture and occlusion. – Malocclusion, with consequent improper functioning of the jaw, can lead to dysfunction in other areas, especially those related to the skeletal muscles. The existence of a direct relationship between occlusion and posture cannot be confirmed, yet various causes contribute to the genesis of postural disorders. As of 2015, sophisticated and very sensitive instruments had been developed, able to monitor both the static and dynamic positioning of the stride: baropodometric platforms, together with electromyographic and morphostructural examinations of the skull and occlusion, make observation of dysfunctions in the lower limbs possible.

Orthodontic therapy in the strictest sense. – At least two types of orthodontic therapies can be distinguished (Graber, Rakosi, Petrovic 1998; Deli 1999; Sforza, Laino, D'Alessio, et al. 2008). The first type treats craniofacial development, suited to patients with growth defects in the facial skeleton or the position of certain teeth that could result in non-eugenic growth. An accurate semiological study must relate to the study of somatic development in the growing child. At the most favourable points of time, fixed or removable devices (called *functional devices*) are applied, which stimulate or inhibit the growth of specific skeletal structures. However, the best treatment of craniofacial development remains the prevention of bad habits. The second type of treatment is related to permanent teeth in youths and adults. Generally, this is comprised of fixed devices consisting of *brackets* (vestibular or lingual) and high-tech metal arches which, thanks to their elastic properties, facilitate the correct positioning of the teeth as regards to site, axis and ratio with the gingiva. In certain limited cases, removable devices can be utilised, such as transparent aligners, which respond to particular aesthetic requirements, increasingly requested by adult patients.

Often, the limit of such treatments is dictated by the patient's peculiar genetic characteristics or by the long time frames that may be required. Significant studies include those on genetics and molecular biology that are revolutionising the subject matter, such as those concerning the *PTH1* gene that influences tooth eruption. In any case, regardless of the type of orthodontic treatment chosen, it is important to be extremely clear with the patient from the outset when outlining the objectives, therapeutic *procedures*, risks and complications.

Patient consent must be based on them being fully informed and having entirely understood so as to avoid medical-legal disputes or, in any case, the patient's dissatisfaction (*Orthodontics, Law and Forensic Medicine*, 2012). Finally, the high costs of O. may preclude orthodontic treatment, especially if long-lasting and targeted towards severe dysmorphism. For this reason, it is necessary to make dental and orthodontic care accessible to vulnerable individuals through the development of synergies and social policies aimed at creating sustainable pathways.

Picture 5.

"Ninth appendix of Treccani Italian Encyclopaedia" of Sciences Letters and Arts published in 2015, page 266. Word "Orthodontics".

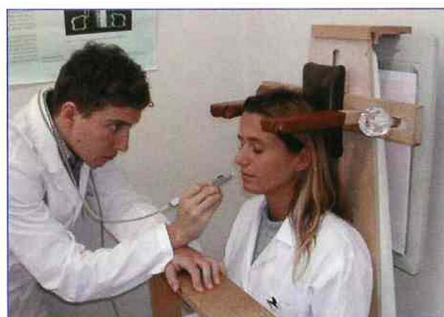
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Raoul D'Alessio - Roberto Deli

Picture 6.

"Ninth appendix of Treccani Italian Encyclopaedia" of Sciences Letters and Arts published in 2015, page 267. Word "Orthodontics".

The research features the improvement from the assessment on pictures or bi-dimensional radiographic projections to the use of the electromagnetic computed digitalizator with many tridimensional points (50 skin points) (pic. 7); as clearly reported in the Ninth Treccani Appendix, *"an original procedure was developed through an electromagnetic 3D digitalization to collect some 3D facial coordinates, through which the volume of every appealing human face of both genders and any age (children, teenagers and adults) could be extracted as an average or at random sample"*.



Picture 7.

Computed electromagnetic digitalizator
(University of Milan, Department of Human Morphology).

Such studies, coordinated by Prof. Chiarella Sforza, published on the most prestigious journals, produced exposure and international prestige (pic. 8).



Picture 8.

Press conference at Catholic University of Rome, (2010) on "Facial attractiveness".
From the left: Alberto Laino, Roberto Deli, Chiarella Sforza and Andrea Osvárt (actress).

The research on tridimensional face scanning through photogrammetric technique, was reinforced thanks to Roberto Deli, international leading figure for his studies on craniofacial growth and its predictability, together with Luigi Galantucci (Professor of Mechanic Mathematics and Management Dept. at Bari Polytechnic, Rapid Pro-typing and Reverse Engineering expert and founder of the Spin-off Polishape 3D Srl Society).

That original and innovative research on feminine facial appeal through 3D Photogrammetry was enthusiastically supported by Carmela Savastano, first female President of SIDO.

In 2010 she renewed the project, agreeing on its aims and clinical implications in Orthodontics, complying with my slogan: *"Not only medicine at beauty service but also beauty at medicine service"*.

The facial examination of the participants to the famous beauty contest "Miss Italia" finalists, was fundamental for the research on Mediterranean appeal of the feminine faces, since it enabled us to make a unique research in the world for 4 consecutive editions thanks to the experience and fine aesthetic sense of the beauty contest President: Patrizia Mirigliani (pics. 9, 10).



Picture 9.

From the left: Luigi Galantucci, Carmela Savastano, "Miss Italia" organizer Patrizia Mirigliani, Raoul D'Alessio and Alberto Laino at the press conference "How beauty ... changed!" (Salsomaggiore Terme, 2010).



Picture 10.

Roberto Deli, Raoul D'Alessio and Alberto Laino with the finalists of Miss Italy 2010 contest.

The use of the 3D Photogrammetric facial analysis became essential for the evaluation of both proportional and volumetric facial balance as reported in the Ninth Appendix of Treccani Encyclopaedia: *"Tridimensional Photogrammetry, besides giving a more realistic assessment of the face, allows an examination of the results that (even if not to be considered*

in absolute terms) can be used for creating Gaussian curves between which any person can be classified. By that technique is possible to detect asymmetries or volumetric flaws and to assess the soft tissues before and after any therapy".

More recently Prof. Roberto Deli inspired mainly by clinical-scientific researches on facial anthropometry, promoted on a national level "Est-Etica e Benessere" brand raising a deep interest for the ethical impact of its mission and involving us to include the word "Orthodontics" in Treccani, a national encyclopaedic monument, where I am honoured to be an Author.

Therefore I do believe that: *"the secret of a successful project can never be found in one person only, but in the magic and pivotal synchrony of each member of the team deeply believing in his mission".*

Postscript of the book “The Citadel History of Orthodontics”

With great pleasure I present this book, the result of the tenaciousness and enthusiasm of two authors, reporting the History of Orthodontics in Italy with a broad overview on its birth and evolution. At the beginning of the last century some pioneers tried to specialize in Orthodontics abroad without being able to create a real school. Edmondo Muzj and his pupil Giorgio Maj should therefore be given the honour of having founded, around the 1930s, the first school: unofficial, but validated by research, publications and exchanges with foreign scientific associations. The real evolution happened in the late 60s, when thanks to the enthusiasm and dedication of a group of friends passionate about the subject (and influenced by what was happening in some North Europe countries and in the US), felt the need to form a group dedicated to the study and spreading of the discipline, improving its knowledge and clinical possibilities. Hence the foundation of the Italian Study Group of Orthodontics (GISO) in La Spezia 7 December 1967 by Giuseppe Cozzani and 12 other friends: Sergio Bassani, Damaso Caprioglio, Elio Di Gioia, Paolo Falconi, Giobatta Garino, Bruno Genone, Roberto Giorgetti, Franco Magni, Eugenio Peduzzi, Franco Poggio, Franco Ragazzoni and Federico Tenti. Later Cesare Luzi (thanks to the interest of these same people) founded in Rome (March 27, 1968) the Italian Society of Orthodontics (SIDO), which would become the home of all the experts in the subject. The active work of some of these pioneers generated the first Italian School of Specialization in Orthodontics at the University of Cagliari, planned and directed for years by Paolo Falconi. The book reveals the history of Italian Orthodontics, describing the most important stages of its evolution. Italian Orthodontics, born as a cinderella in the European scene, grew thanks to the initial contribution of the courses by Anthony Giannelli (Boston University) and, by the commitment and dedication of many, has been able to gain esteem and authority worldwide. As president of the Angle Society of Europe (ASE) and President elect of the SIDO for 2020, I proudly present this editorial effort that testifies and describes the stages of a wide evolution. If we can not build the future without knowing the past, this book will not only be read with pleasure by the orthodontists, but it will also represent a guiding star to the youngest in whose hands we entrust the evolution and prestige of our discipline in the future. While congratulating the two authors, Damaso Caprioglio and Pietro Di Michele, a note of merit goes to Franco Magni who supervised the English text and to the Publisher who believed in this work. I wish this book will have a great success equal to the enthusiasm of those who contributed to its writing.

B. Giuliano Maino

President of ASE (Angle Society of Europe).

Presidente elect 2020 of SIDO (Società Italiana di Ortodonzia)



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“Great, good friends! Dear Maso, your winning team once again scored a goal. I would like just to point out that the team is also composed of the irreplaceable and tenacious Gabriela with her human and political profile more than international for the “intercontinental SIDO”. This is why I propose that we give worthy prominence to Dr. and Mrs. Magni embodying the “living couple” who fully and perfectly lived all the time span from the birth of SIDO to its international development, which made Italy and our SIDO appreciated all over the world. “Viva” Gabriela and her being a Woman in a forerunner and splendid way!

A sincere thanks to all with affection and deep gratitude.”

Alberto Laino