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Measuring minorities: Reflections on the cephalic index

Lucie Biehler-Gomez[1], *Alessandro Porro*[2,3]

[1]LABANOF Laboratorio di Antropologia e Odontologia Forense, Dipartimento di Scienze Biomediche per la Salute, Università degli Studi di Milano, Milan, Italy; [2]DISCCO Dipartimento di Scienze Cliniche e di Comunità, Università degli Studi di Milano, Milano, Italy; [3]CRC Centro di Salute Ambientale, Università degli Studi di Milano, Milano, Italy

Abstract. The cephalic index, introduced in the 19th century as an anthropometric tool for classifying cranial shapes, has had a complex and controversial history. Initially developed as a seemingly objective measure, it became a cornerstone of racial typologies and was co-opted to support socio-political ideologies that reinforced racial hierarchies. Through its application, the index perpetuated unfounded associations between cranial morphology and intellectual or moral capacities. This paper critically examines the rise, misuse, and eventual rehabilitation of the cephalic index in Italy, exploring its historical trajectory from a tool of scientific inquiry to an instrument of exclusionary ideologies and back to its contemporary medical applications. While its use today in medical diagnostics, such as cranial deformity assessments, reflects a shift towards neutral and therapeutic purposes, the legacy of its misuse serves as a cautionary tale. This study emphasizes the importance of preserving the memory of the cephalic index's history to prevent the recurrence of its distorted applications. By reflecting on the lessons from its past, we underscore the ethical responsibilities inherent in anthropological and medical research and the need to remain vigilant against the misuse of scientific tools. The cephalic index's journey exemplifies how science can be both a tool for understanding human diversity and, if misused, a vehicle for perpetuating bias.

Key words: cephalic index - Italy XIXth-XXth century, anthropometry, racial hierarchies

Introduction

Anthropology is broadly defined as the study of the origin and development of human societies and cultures. Within this field, physical anthropology focuses specifically on understanding human origins, evolution, and diversity. This sub-discipline addresses major questions surrounding human and nonhuman primate evolution, human variation and its significance, and the biological bases of human behavior. In the 18th and 19th centuries, naturalists undertook efforts to classify human groups based on visible human variation. Initially, these efforts relied on subjective observations, but over time, they transitioned to more objective, standardized, and replicable methods. A significant methodological development during the 19th century was the introduction of anthropometry, which became a focal point in the scientific study of human variation (1).

In 1735, Carl Linnaeus (1707-1778) published *Systema naturae* (2), one of the first systematic classifications of all living organisms, which included a categorization of human populations into so-called "races". This classification reflected the prevailing views of the time and included both real and imagined human types, such as feral and monstrous races. The domain of teratology lies beyond the scope of this study; however, the concept of *monstrosity* has accompanied anthropological and medical-surgical determinations since the works of Ulisse Aldrovandi (1522–1605) and Fortunio Liceti (1577–1657). Linnaeus's taxonomy categorized humans primarily by skin color and assigned them to four groups, each associated with moral and intellectual traits: *Homo Americanus*, described as reddish,

choleric, obstinate, and ordered by cultural customs; *Homo Europaeus*, characterized as white, gentle, fickle, sanguine, blue-eyed, and commanded by law; *Homo Asiaticus*, identified as yellow, grave, avaricious, dignified, and ruled by opinion; and *Homo Afer*, depicted as black, phlegmatic, lazy, cunning, lustful, and governed by caprice. Notably, among the aforementioned characteristics, one can observe the presence of temperaments intrinsic to the classical theory of humors. This typology laid the groundwork for subsequent racial classifications. In his 1781 treatise *On the Natural Variety of Mankind* (3), Johann Friedrich Blumenbach expanded on Linnaeus's work by dividing humanity into five races—Caucasian, Mongolian, American, Ethiopian, and Malayan—based on skin color, hair type, facial features, and head shape. Blumenbach proposed that these races were phenotypic forms that had diverged from an original proto-stock.

Subsequent efforts concentrated on identifying specific racial traits that could be measured and quantified, with the aim of enhancing the understanding of racial characteristics and their inheritance. This focus on nonadaptive traits—those believed to be stable within populations except in cases of admixture—led to the development of anthropometric methods (4). The cephalic index, in particular, emerged as one of the most widely used and enduring anthropometric tools for creating and validating racial typologies. Defined as the ratio of the maximum width to the maximum length of the head, the cephalic index was introduced by Anders Adolph Retzius (1796-1860) in the early 19th century. Retzius's classification divided human heads into two primary categories: dolichocephalic, or long-headed, with a cephalic index of 75 or less, and brachycephalic, or short-headed, with a cephalic index above 75 (5). Later physical anthropologists, such as Pierre Paul Broca (1824-1880) (6) and Thomas Huxley (1825-1895) (7), refined this classification by adding intermediate categories and additional descriptive terms, such as subdolichocephalic, mesaticephalic, subbrachycephalic, brachistocephalic, eurycephalic, orthocephalic, mesocephalic, and mecistocephalic.

However, the scientific validity and ethical implications of these racial typologies were soon questioned. Franz Boas (1858-1942), a prominent critic, argued in his 1912 paper *Changes in the Bodily Form of Descendants of Immigrants* (5) that the values assigned to the cephalic index were arbitrary, serving only as convenient labels for classification rather than representing meaningful diagnostic values. Boas rejected the notion of biological types and emphasized that terms like brachycephaly and dolichocephaly should be understood as descriptive phenotypes:

> "The fact that anthropologists are in the habit of calling heads of a length/breadth index of 80 and more, brachycephalic heads, does not constitute brachycephaly a distinct biological type, but is a mere convenience of description. […] The terms dolicho-, meso-, and brachy-cephaly have only a meaning as descriptive terms, not as biological types. Owing to this frequent misunderstanding and the erroneous opinion that these groups have really been proved to be distinct biological races, I have avoided for years these terms, notwithstanding their convenience, and speak only of more or less rounded, respectively, elongated heads" (5).

Despite these critiques, the cephalic index continued to be used as a tool for classification of human variation into racial types. It even became an instrument for studying heredity and racial history (1). This application was grounded in the belief that the shape and size of the cranium were stable traits, inherited and established early in life. Indeed, hereditary theory posits that the form of the head (or rather cranium) of each race has remained constant since very remote times, is inherited, and becomes constant about two years after birth (8). This perspective also intersected with the emerging "biology of the Jews" in the 19th century, where the "Jewish race" became a newfound subject of scientific study. The main interest lied in the idea that the Jews were a homogenous, unmixed, and persistent racial type, seen as a socially isolated and inbred group, clinging conservatively to their traditions, resisting change, and refusing environmental, cultural, or social forces to alter their way of life. This belief positioned Jews as an ideal group for studying human heredity and racial history, based on the assumption that they represented a "pure" racial type (9).

What began as an effort to classify human variation based on naturalistic observations soon went far

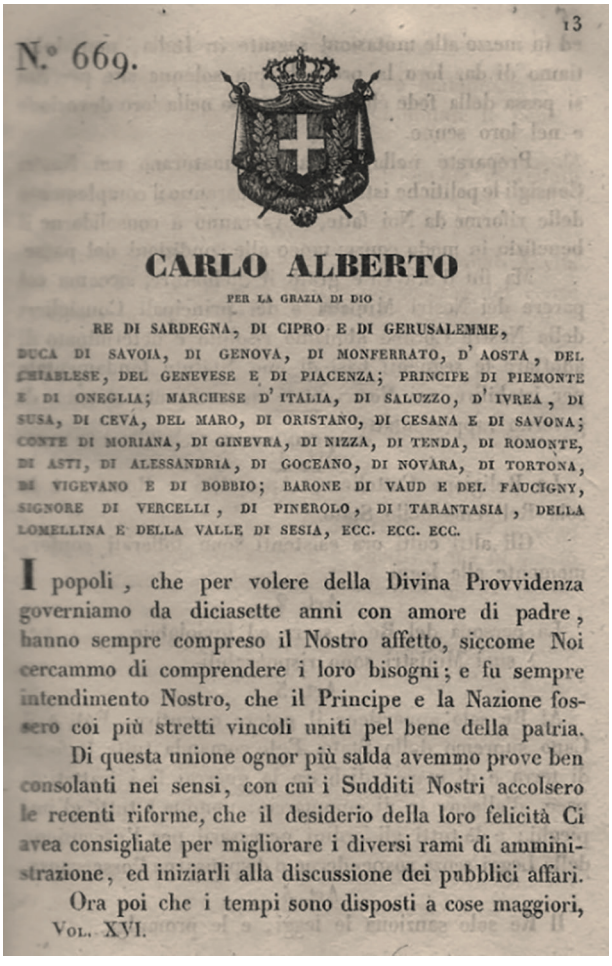
beyond an analysis of human variation, its significance, and origin, and became entangled with broader sociopolitical ideologies. For instance, Linnaeus's taxonomy, while intended as a neutral naturalistic endeavor, also lent credence to popular and political ideas about human differences, extending beyond mere classification to assertions about racial character, temperament, personality, intelligence, and behavior (1). Some scholars of the period went so far as to argue that anatomical comparisons demonstrated that different "races" represented distinct species with separate origins (10). Within this context, craniometry established a relationship between cranium shape and mental faculties, further reinforcing racial hierarchies. Before the cephalic index, the facial angle was well-established as an indicator of beauty and intelligence but also provided an implicit scale of inferiority and stupidity and became a criterion for racial somatology (11). The cephalic index, originally intended as a tool for classifying human cranium shapes, built on this premise and associated physical traits with underlying mental or moral characteristics. In this framework, the size and shape of the head were perceived as proxies for the size and shape of the brain, which were a reflection for the capacity for intelligence, morality, and other psychological attributes, thereby providing a seemingly scientific justification for racial hierarchies (11).

Today, the cephalic index remains in use, though it has largely shed its racist ideological underpinnings. One example of its contemporary application is in the field of medical diagnostics, particularly in determining eligibility for cranial remodeling orthoses for infants with cranial deformities (12). The cephalic index offers a simple, rapid, and cost-effective method for measuring cranial shape parameters. Using tools such as calipers, measurement tapes, and advanced scanning systems, clinicians can quantify cranial asymmetry, disproportion, and deformation, thereby providing a baseline for monitoring progress over time. Although landmarks and severity scales may vary across publications, the fundamental calculation of the index remains substantially the same as it was nearly two centuries ago (12).

Minorities in Italy

The early months of 1848 were marked in the Kingdom of Sardinia by the promulgation of several decrees issued by King Charles Albert of Savoy-Carignano (1798–1849), irrevocably altering the destiny of the populations under his rule.

On February 8, 1848, a *proclamation* outlined the principles that would guide the enactment of a constitution-based *statute* (Figure 1). On February 17, 1848, *Royal Letters Patent* granted (13) the Waldensians "*full civil and political rights as subjects of the kingdom, including the ability to attend schools and universities and to obtain academic degrees*" [*a godere di tutti i diritti civili e politici de' suoi sudditi; a frequentare le scuole dentro e fuori delle Università, ed a conseguire i gradi accademici*] (Figure 2).



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N.° 669.

CARLO ALBERTO

PER LA GRAZIA DI DIO

RE DI SARDEGNA, DI CIPRO E DI GERUSALEMME,

DUCA DI SAVOIA, DI GENOVA, DI MONFERRATO, D' AOSTA, DEL CHIABLESE, DEL GENEVESE E DI PIACENZA; PRINCIPE DI PIEMONTE E DI ONEGLIA; MARCHESE D' ITALIA, DI SALUZZO, D' IVREA, DI SUSA, DI CEVA, DEL MARO, DI ORISTANO, DI CESANA E DI SAVONA; CONTE DI MORIANA, DI GINEVRA, DI NIZZA, DI TENDA, DI ROMONTE, DI ASTI, DI ALESSANDRIA, DI GOCEANO, DI NOVARA, DI TORTONA, DI VIGEVANO E DI BOBBIO; BARONE DI VAUD E DEL FAUCIGNY, SIGNORE DI VERCELLI, DI PINEROLO, DI TARANTASIA, DELLA LOMELLINA E DELLA VALLE DI SESIA, ECC. ECC. ECC.

I popoli, che per volere della Divina Provvidenza governiamo da diciasette anni con amore di padre, hanno sempre compreso il Nostro affetto, siccome Noi cercammo di comprendere i loro bisogni; e fu sempre intendimento Nostro, che il Principe e la Nazione fossero coi più stretti vincoli uniti pel bene della patria.

Di questa unione ognor più salda avemmo prove ben consolanti nei sensi, con cui i Sudditi Nostri accolsero le recenti riforme, che il desiderio della loro felicità Ci avea consigliate per migliorare i diversi rami di amministrazione, ed iniziarli alla discussione dei pubblici affari.

Ora poi che i tempi sono disposti a cose maggiori,

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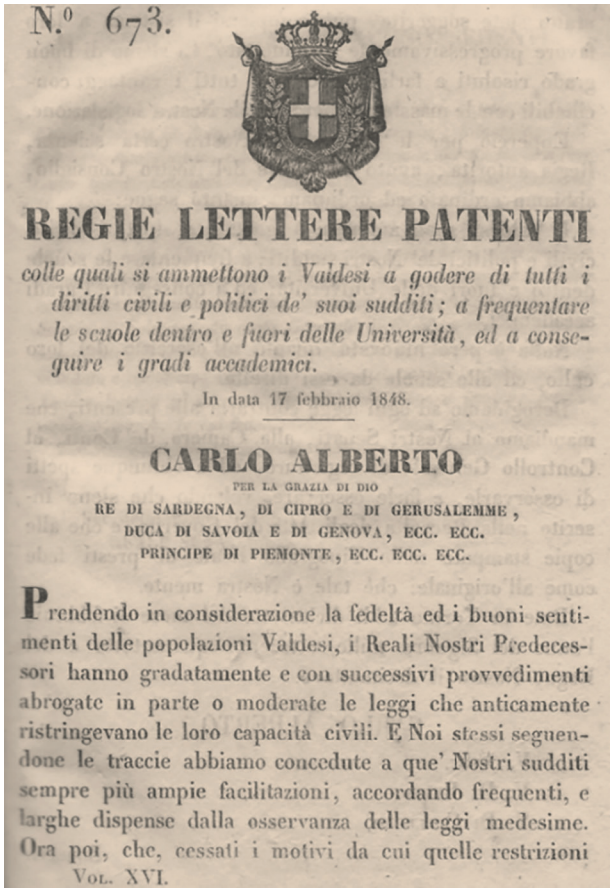
Figure 1. The *Proclamation* of February 8, 1848.



N.° 673.

REGIE LETTERE PATENTI

colle quali si ammettono i Valdesi a godere di tutti i diritti civili e politici de' suoi sudditi; a frequentare le scuole dentro e fuori delle Università, ed a conseguire i gradi accademici.

In data 17 febbraio 1848.

CARLO ALBERTO

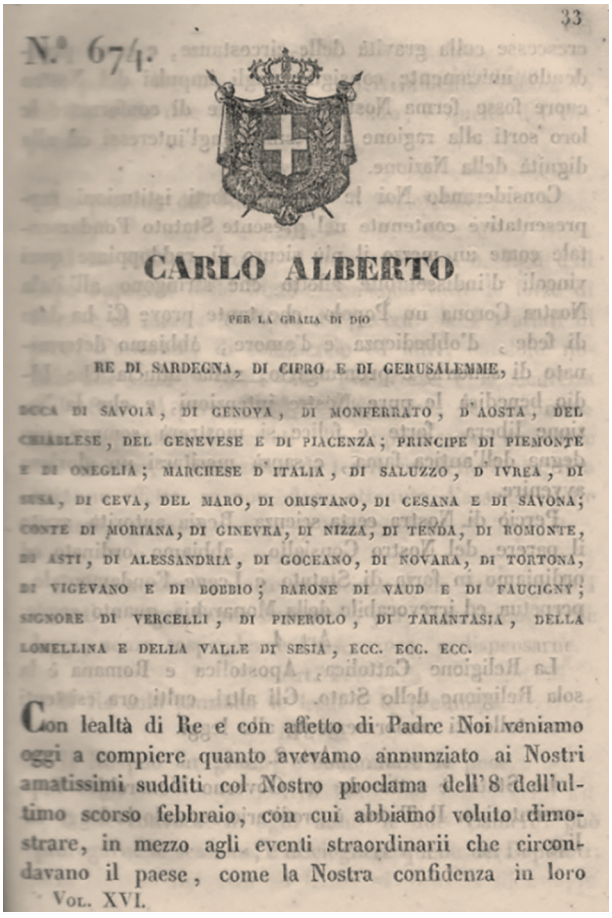
PER LA GRAZIA DI DIO

RE DI SARDEGNA, DI CIPRO E DI GERUSALEMME, DUCA DI SAVOIA E DI GENOVA, ECC. ECC. PRINCIPE DI PIEMONTE, ECC. ECC. ECC.

Prendendo in considerazione la fedeltà ed i buoni sentimenti delle popolazioni Valdesi, i Reali Nostri Predecessori hanno gradatamente e con successivi provvedimenti abrogate in parte o moderate le leggi che anticamente ristringevano le loro capacità civili. E Noi stessi seguendone le traccie abbiamo concedute a que' Nostri sudditi sempre più ampie facilitazioni, accordando frequenti, e larghe dispense dalla osservanza delle leggi medesime. Ora poi, che, cessati i motivi da cui quelle restrizioni

Vol. XVI.

Figure 2. The *Royal Letters Patent* of February 17, 1848.



33

N.° 674.

CARLO ALBERTO

PER LA GRAZIA DI DIO

RE DI SARDEGNA, DI CIPRO E DI GERUSALEMME, DUCA DI SAVOIA, DI GENOVA, DI MONFERRATO, D'AOSTA, DEL CHABLESE, DEL GENEVESE E DI PIACENZA; PRINCIPE DI PIEMONTE E DI ONEGLIA; MARCHESE D'ITALIA, DI SALUZZO, D'IVREA, DI SUSA, DI CEVA, DEL MARO, DI ORISTANO, DI CESANA E DI SAVONA; CONTE DI MORIANA, DI GINEVRA, DI NIZZA, DI TENDA, DI ROMONTE, DI ASTI, DI ALESSANDRIA, DI GOCEANO, DI NOVARA, DI TORTONA, DI VIGEVANO E DI BOBBIO; BARONE DI VAUD E DI FAUCIGNY; SIGNORE DI VERCELLI, DI PINEROLO, DI TARANTASIA, DELLA LOMELLINA E DELLA VALLE DI SESIA, ECC. ECC. ECC.

Con lealtà di Re e con affetto di Padre Noi veniamo oggi a compiere quanto avevamo annunziato ai Nostri amatissimi sudditi col Nostro proclama dell'8 dell'ultimo scorso febbraio, con cui abbiamo voluto dimostrare, in mezzo agli eventi straordinarii che circondavano il paese, come la Nostra confidenza in loro

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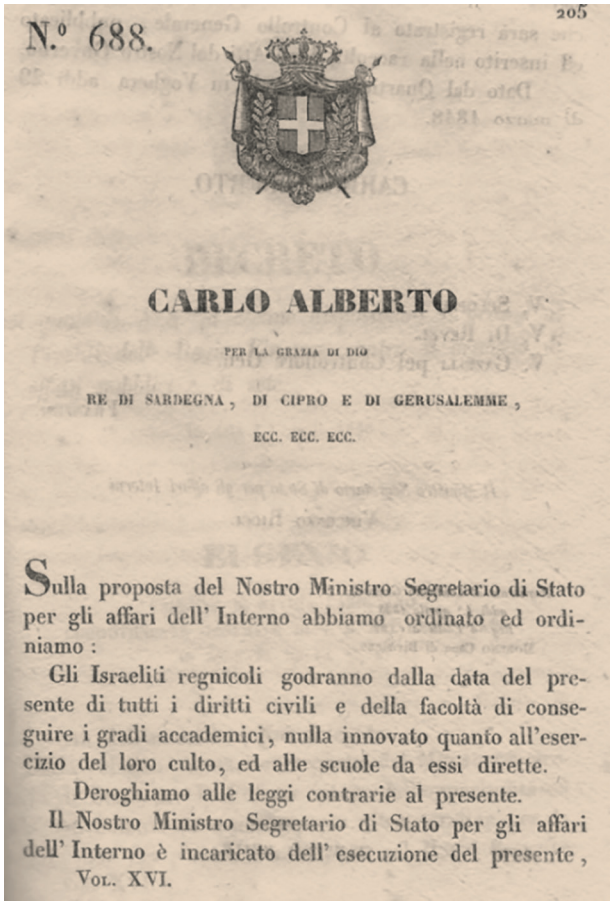
Figure 3. The *Statute* of March 4, 1848.

The implementation of these *Letters Patent* was initially delayed to allow for approval by the *Royal Chamber of Accounts* and the senatorial authorities. The *Royal Chamber of Accounts* approved them on February 18, 1848. Subsequently, the *Senate* of Turin approved them on February 19, 1848; the Senate of Nice (then part of the Kingdom of Sardinia) on February 21, 1848; the Senate of Genoa on February 24, 1848; and the Senate of Casale on February 27, 1848. It should be noted, however, that Sardinia maintained a separate *status* at the time.

The date of February 17 is still solemnly commemorated by Waldensian communities, not only in the valleys of Western Piedmont—known as the *Waldensian Valleys* (comprising the Pellice, Chisone, and Germanasca Valleys)—but also across the global Waldensian *diaspora* (14).

On March 4, 1848, the *Statute* was officially enacted (15) (Figure 3). On March 29, 1848, a *Royal Decree* (Figure 4) extended *full civil rights* and the right to obtain *academic degrees* to *Jewish subjects of the kingdom*. Furthermore, the *Royal Decree* of April 15, 1848, No. 700, promulgated by Eugene of Savoy-Carignano (1816–1888), acting as Lieutenant of King Charles Albert (who was engaged in military operations during the *First War of Independence*, which began on March 23, 1848), allowed Jewish subjects to "*participate in military conscription in accordance with existing laws and regulations*" [*ammessi a far parte della Leva militare di conformità alle leggi e discipline esistenti*]. This marked a significant milestone, as Jews had never before served in the military.

Finally, the *Law* of June 19, 1848, No. 735, also promulgated by Eugene of Savoy-Carignano as Lieutenant of King Charles Albert, reaffirmed that



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N.° 688.

CARLO ALBERTO

PER LA GRAZIA DI DIO

RE DI SARDEGNA, DI CIPRO E DI GERUSALEMME,

ECC. ECC. ECC.

Sulla proposta del Nostro Ministro Segretario di Stato per gli affari dell' Interno abbiamo ordinato ed ordiniamo:

Gli Israeliti regnicoli godranno dalla data del presente di tutti i diritti civili e della facoltà di conseguire i gradi accademici, nulla innovato quanto all'esercizio del loro culto, ed alle scuole da essi dirette.

Deroghiamo alle leggi contrarie al presente.

Il Nostro Ministro Segretario di Stato per gli affari dell' Interno è incaricato dell' esecuzione del presente,

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Figure 4. The *Royal Decree* of March 29, 1848.

"*differences in religious affiliation did not exempt individuals from enjoying civil and political rights or from eligibility for civil and military positions*" [*la differenza di culto non forma*[va] *eccezione al godimento dei diritti civili e politici, ed all'ammissibilità alle cariche civili e militari*].

For the military sphere, this provision brought no major changes for Waldensian communities, who had frequently served in the Savoyard army, often in autonomous units.

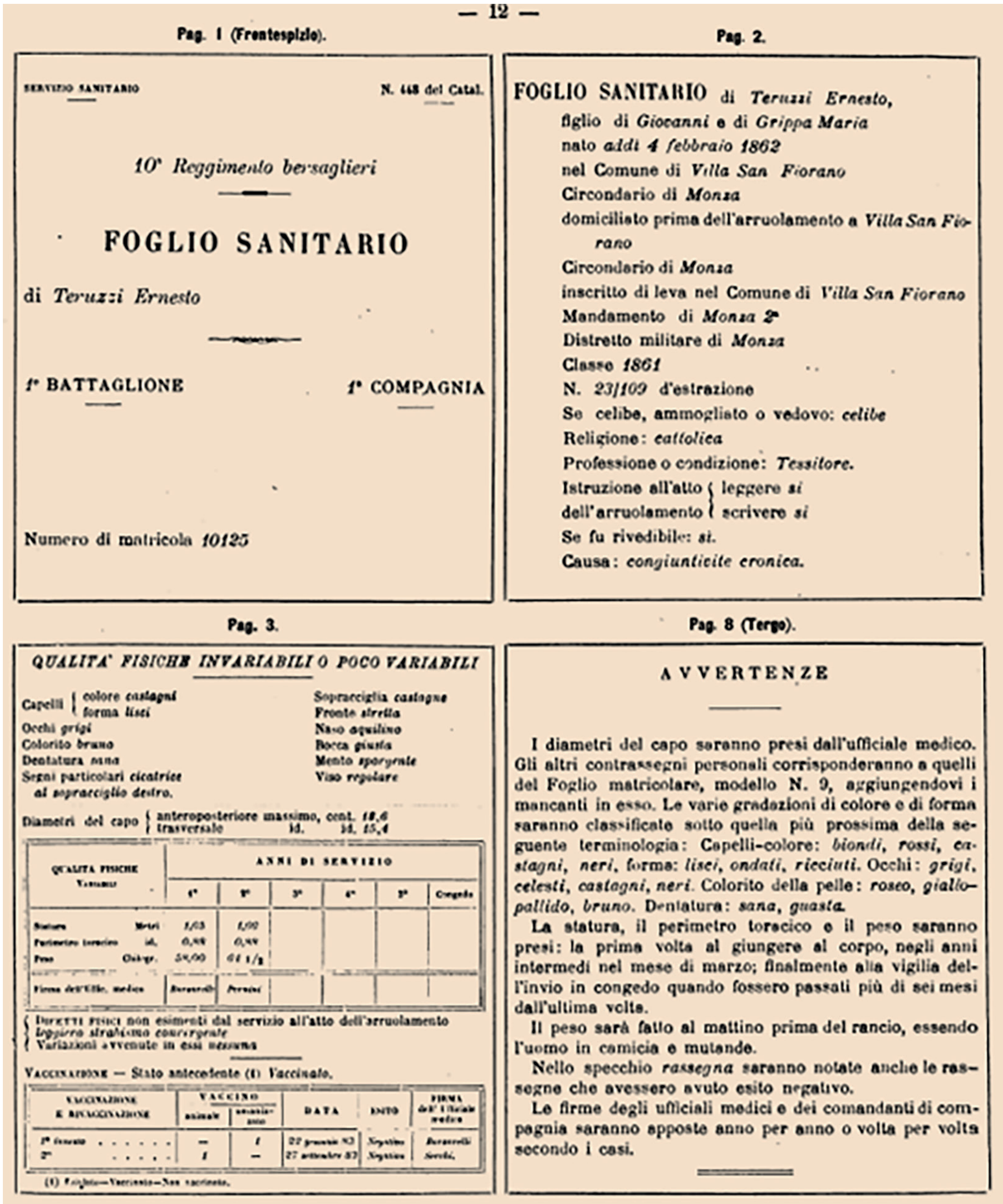
In the *Royal Letters Patent* of February 17, 1848, concerning the Waldensians, it was stated that "*however, nothing is altered regarding the exercise of their worship and the schools they manage*" [*Nulla è però innovato quanto all'esercizio del loro culto, ed alle scuole da essi dirette*]. In essence, their worship was tolerated only within the alpine valleys where the Waldensians had resided for centuries.

Similarly, the *Royal Decree* of March 29, 1848, concerning Jewish communities, declared that "*nothing is altered regarding the exercise of their worship and the schools they manage*" [*nulla* [era] *innovato quanto all'esercizio del loro culto, ed alle scuole da essi dirette*].

One could argue that the situation still resembled that of the *ghettos*. It mirrored the conditions established by the 1770 *Constitutions*, which enforced nightly closures of ghettos, segregation during major Catholic festivities, restrictions on property ownership and commerce, compulsory attendance at sermons, and the ever-looming threat—also faced by Waldensians—of child abductions for forced Catholic conversion. Additionally, Jews were obligated to wear identifying symbols.

Through this framework, the existence of two *minorities* within the Kingdom of Sardinia was institutionalized, even as their emancipation was formally decreed.

The clarity of Article 1 of the *Statute* of March 4, 1848, was unequivocal: "*The Catholic, Apostolic, and Roman religion is the sole religion of the State. Other existing religions are tolerated in accordance with the laws*" [*La Religione Cattolica, Apostolica e Romana è la sola Religione dello Stato. Gli altri culti ora esistenti sono tollerati conformemente alle leggi*]. Ironically, the condition of religious minorities had been, in some respects, more favorable in the recent past. In 1821, during the enactment of the Spanish Constitution in the Kingdom of Sardinia under Charles Albert, then Lieutenant of King Charles Felix of Savoy (1765–1831), a provision explicitly referenced the continued practice of *other religions, permitted until now*. The decline from *permission* to *tolerance* was formalized in the *Civil Code* of 1837, promulgated by Charles Albert, and reiterated in the *Statute* of March 4, 1848. Article 1, Section 3, of the 1837 Albertine Code stated: *"Other religions currently existing in the State are merely tolerated in accordance with their specific customs and regulations"* [*Gli altri culti attualmente esistenti nello Stato sono semplicemente tollerati secondo gli usi ed i regolamenti speciali che li riguardano*]. Regarding *civil rights* for non-Catholics (a term encompassing Waldensians and Jews), the code stipulated: "*Non-Catholics enjoy civil rights according to the laws, regulations, and customs concerning*



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Pag. 1 (Frontespizio).

SERVIZIO SANITARIO N. 448 del Catal.

10° Reggimento bersaglieri

FOGLIO SANITARIO

di *Teruzzi Ernesto*

1° BATTAGLIONE 1° COMPAGNIA

Numero di matricola *10125*

Pag. 2.

FOGLIO SANITARIO di *Teruzzi Ernesto*,
figlio di *Giovanni* e di *Grippa Maria*
nato *addì 4 febbraio 1862*
nel Comune di *Villa San Fiorano*
Circondario di *Monza*
domiciliato prima dell'arruolamento a *Villa San Fiorano*
Circondario di *Monza*
inscritto di leva nel Comune di *Villa San Fiorano*
Mandamento di *Monza 2°*
Distretto militare di *Monza*
Classe *1861*
N. *23/109* d'estrazione
Se celibe, ammogliato o vedovo: *celibe*
Religione: *cattolica*
Professione o condizione: *Tessitore.*
Istruzione all'atto dell'arruolamento { leggere *sì* / scrivere *sì*
Se fu rivedibile: *sì.*
Causa: *congiuntivite cronica.*

Pag. 3.

QUALITA' FISICHE INVARIABILI O POCO VARIABILI

Capelli { colore *castagni* / forma *lisci*
Occhi *grigi*
Colorito *bruno*
Dentatura *sana*
Segni particolari *cicatrice al sopracciglio destro.*

Sopracciglia *castagne*
Fronte *stretta*
Naso *aquilino*
Bocca *giusta*
Mento *sporgente*
Viso *regolare*

Diametri del capo { anteroposteriore massimo, cent. *18,6* / trasversale id. id. *15,4*

QUALITÀ FISICHE Variabili		ANNI DI SERVIZIO					
		1°	2°	3°	4°	5°	Congedo
Statura	Metri	*1,63*	*1,66*				
Perimetro toracico	id.	*0,88*	*0,89*				
Peso	Chilogr.	*58,00*	*61 1/2*				
Firma dell'Uffic. medico		*Burarelli*	*Persinì*				

{ Difetti fisici non esimenti dal servizio all'atto dell'arruolamento *leggiero strabismo convergente*
{ Variazioni avvenute in essi *nessuna*

Vaccinazione — Stato antecedente (1) *Vaccinato.*

Vaccinazione e rivaccinazione	Vaccino animale	Vaccino umanizzato	Data	Esito	Firma dell'Ufficiale medico
1° innesto	—	*1*	*22 gennaio 83*	*Negativo*	*Burarelli*
2°	*1*	—	*27 settembre 83*	*Negativo*	*Sorchi*

(1) Vaiuolo—Vaccinato—Non vaccinato.

Pag. 8 (Tergo).

AVVERTENZE

I diametri del capo saranno presi dall'ufficiale medico. Gli altri contrassegni personali corrisponderanno a quelli del Foglio matricolare, modello N. 9, aggiungendovi i mancanti in esso. Le varie gradazioni di colore e di forma saranno classificate sotto quella più prossima della seguente terminologia: Capelli-colore: *biondi, rossi, castagni, neri*, forma: *lisci, ondati, ricciuti*. Occhi: *grigi, celesti, castagni, neri*. Colorito della pelle: *roseo, giallo-pallido, bruno*. Dentatura: *sana, guasta*.

La statura, il perimetro toracico e il peso saranno presi: la prima volta al giungere al corpo, negli anni intermedi nel mese di marzo; finalmente alla vigilia dell'invio in congedo quando fossero passati più di sei mesi dall'ultima volta.

Il peso sarà fatto al mattino prima del rancio, essendo l'uomo in camicia e mutande.

Nello specchio *rassegna* saranno notate anche le rassegne che avessero avuto esito negativo.

Le firme degli ufficiali medici e dei comandanti di compagnia saranno apposte anno per anno o volta per volta secondo i casi.

Figure 5. The *Health Form.* Partial Reproduction (25).

them. The same applies to Jews" [*I non cattolici ne godono secondo le leggi, i regolamenti e gli usi che li riguardano. Lo stesso è degli ebrei*] (16). The criteria defining the degree and nature of *tolerance* remained the standard until 1929, when the fascist government promulgated a special law on permitted religions under the *Lateran Pacts* (*Law* of June 24, 1929, No. 1159). Together with the subsequent implementing regulation (*Royal Decree* of June 28, 1930, No. 280), this legislation gave the fascist government complete control over the fate of minority communities (17).

Returning to the period following March 1848, the proclamation of the Kingdom of Italy on March 17, 1861, did not alter this situation. The *Statute* of

March 4, 1848, remained fully in force. Despite the gradual emancipation of the Waldensian and Jewish populations, the Savoyard Kingdom of Italy effectively cemented a minority stereotype. While the territorial characteristics of these groups differed, the shared themes of geographic *concentration* (in *ghettos* or *valleys*) and *diaspora* united the two minoritarian communities.

In a nascent nation-state, differences were inevitable. Building a unified legal and administrative framework was only one challenge among many. A phrase attributed to Massimo Taparelli d'Azeglio (1798–1866) (18), reportedly uttered after the unification of Italy in 1861, encapsulates this complexity: *"Having made Italy, we must now make Italians"* [*Fatta l'Italia, facciamo gli Italiani*]. Regardless of its attribution or exact phrasing (19), the statement underscored the immense difficulty of creating a unified state.

In 1848, the Italian peninsula was divided into nine states: the Kingdom of Sardinia, the Principality of Monaco, the Lombard-Venetian Kingdom, the Duchy of Parma and Piacenza, the Duchy of Modena and Reggio, the Republic of San Marino, the Grand Duchy of Tuscany (including the Duchy of Lucca), the Papal States and the Kingdom of the Two Sicilies.

Beyond the two *minorities* discussed, were there other populations comparable in numerical size, territorial presence, or modern-day continuity? Aside from settlements concentrated near the Adriatic coast, one might recall the Albanian communities in Apulia, Calabria, and Sicily, as well as German-speaking groups in alpine regions, *Slavic* settlements in the Adriatic hinterland, Grecanic populations, and linguistic islands such as the Ligurian-speaking community in Carloforte and the Catalan-speaking community in Alghero.

At the end of the 19th century: anthropological minorities in the Italian peninsula

Transitioning from a political-administrative perspective to a more scientific one, we encounter the anthropological dimension, which brings us to the *cephalic index*.

In the late 19th century, an Italian-language publication of great significance emerged, born of a unique opportunity for anthropometric evaluation: The *Antropometria Militare* (1896–1905), printed in two volumes and one atlas (20). The author, Ridolfo Livi (1856–1920) (21), was a military physician, health statistician, anthropologist, contributor to the *Giornale di Medicina Militare* from 1888, and its editor-in-chief from 1898 to 1912. He also served as director of the Military Health Application School in Florence (1912) and Major General of the General Inspectorate of Military Health in Rome. He was the son of Carlo Livi (1823–1877), a renowned psychiatrist who directed the asylums in Siena and Reggio Emilia (22).

The *Antropometria Militare* was an extensive analysis of 299,355 health records, rather than a collection of measurements entirely conducted by Livi himself (although some of his measurements were included).

This work laid the foundation for modern military anthropometry, gaining recognition both in Italy and abroad.

It was based on data from a specific *health form* (20), developed in 1879 (23, 24) by Medical Lieutenant Colonel Salvatore Guida. This form included craniometric data, among other details.

Guida himself emphasized the importance of accurate data recording for anthropological analysis. However, the reliability of the data was limited by the variability of the recorders and the instruments used, in addition to differences between cephalometric and craniometric measurements (and thus between the *cephalic* and *cranial* indices).

Craniometric data had to be collected exclusively by medical officers.

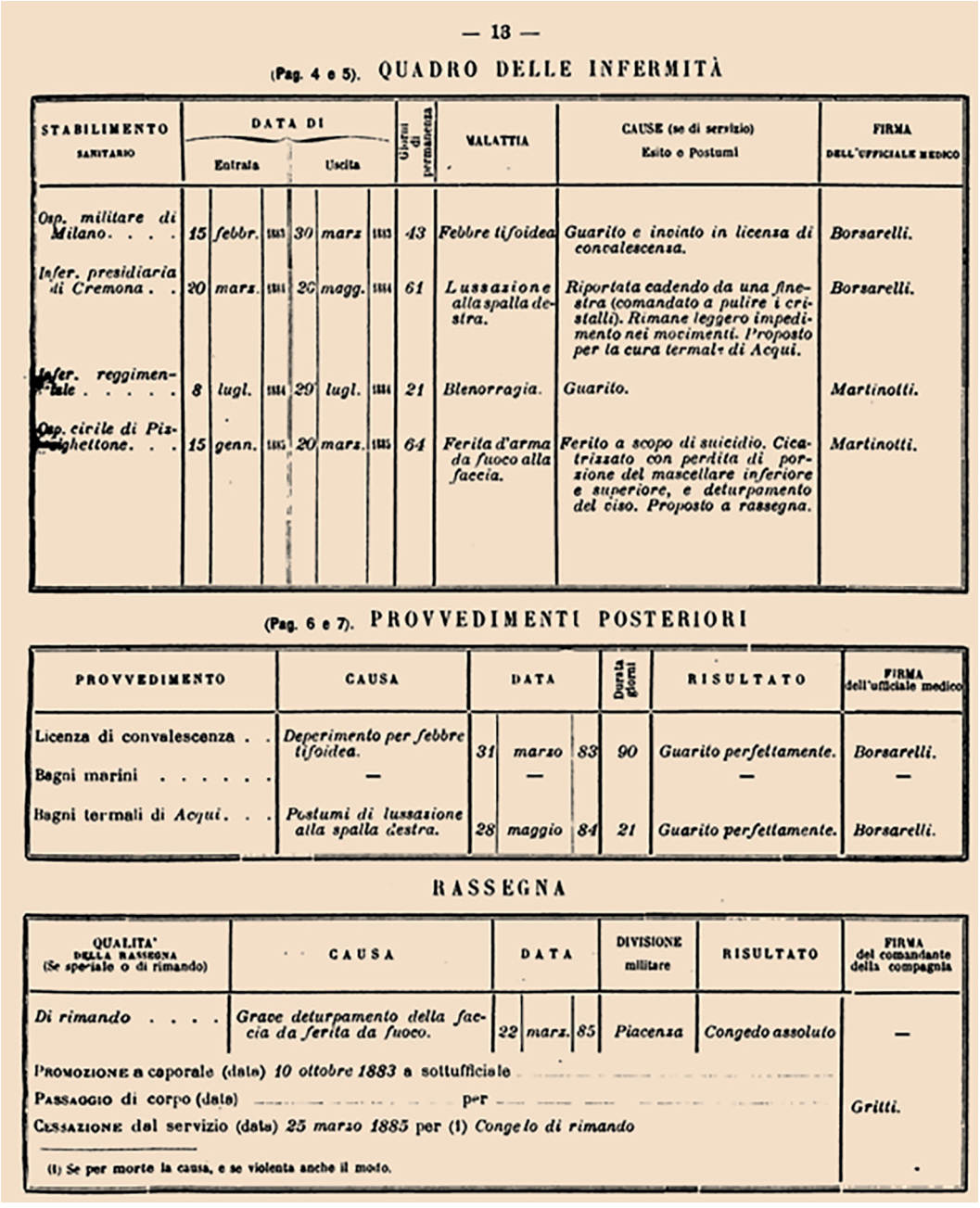
The health form was part of the *booklet* documenting the soldier's entire military history, comprising its first eight pages (Figg. 5-6).

Head diameters were classified among the *physical traits considered invariant or minimally variable* (25). The form also included sections for recording illnesses that occurred during the soldier's military career.

Livi's analysis of these health forms later became the second part of his work, published in 1905 (26).

This second volume was also favorably reviewed (27).

Livi had already examined health forms concerning the cephalic index (28), highlighting its general distribution across the Kingdom of Italy.



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(Pag. 4 e 5). QUADRO DELLE INFERMITÀ

STABILIMENTO SANITARIO	DATA DI Entrata			DATA DI Uscita			Giorni di permanenza	MALATTIA	CAUSE (se di servizio) Esito e Postumi	FIRMA DELL'UFFICIALE MEDICO
Osp. militare di Milano. . . .	15	febbr.	1883	30	marz	1883	43	Febbre tifoidea	Guarito e inviato in licenza di convalescenza.	Borsarelli.
Infer. presidiaria di Cremona . .	20	marz.	1884	20	magg.	1884	61	Lussazione alla spalla destra.	Riportata cadendo da una finestra (comandato a pulire i cristalli). Rimane leggero impedimento nei movimenti. Proposto per la cura termale di Acqui.	Borsarelli.
Infer. reggimentale	8	lugl.	1884	29	lugl.	1884	21	Blenorragia.	Guarito.	Martinotti.
Osp. civile di Pizzighettone. . .	15	genn.	1885	20	marz.	1885	64	Ferita d'arma da fuoco alla faccia.	Ferito a scopo di suicidio. Cicatrizzato con perdita di porzione del mascellare inferiore e superiore, e deturpamento del viso. Proposto a rassegna.	Martinotti.

(Pag. 6 e 7). PROVVEDIMENTI POSTERIORI

PROVVEDIMENTO	CAUSA	DATA			Durata giorni	RISULTATO	FIRMA dell'ufficiale medico
Licenza di convalescenza . .	Deperimento per febbre tifoidea.	31	marzo	83	90	Guarito perfettamente.	Borsarelli.
Bagni marini	—	—			—	—	—
Bagni termali di Acqui. . .	Postumi di lussazione alla spalla destra.	28	maggio	84	21	Guarito perfettamente.	Borsarelli.

RASSEGNA

QUALITA' DELLA RASSEGNA (Se speciale o di rimando)	CAUSA	DATA			DIVISIONE militare	RISULTATO	FIRMA del comandante della compagnia
Di rimando	Grave deturpamento della faccia da ferita da fuoco.	22	marz.	85	Piacenza	Congedo assoluto	—

Promozione a caporale (data) *10 ottobre 1883* a sottufficiale

Passaggio di corpo (data) — per —

Cessazione del servizio (data) *25 marzo 1885* per (1) *Congedo di rimando*

(1) Se per morte la causa, e se violenta anche il modo.

Gritti.

Figure 6. The *Health Form*. Partial Reproduction (25).

Ridolfo Livi personally conducted measurements using a metallic *cadre à maxima* (see below) in the Reggio Emilia District.

However, for the purposes of this analysis, Livi's preliminary work is less relevant, as it does not delve into the specific details of *minority* populations in Italy.

Although this preliminary contribution is noteworthy, the monumental work published by Livi in 1896 was immediately recognized as foundational for anthropological disciplines (29, 30). Among the reviews of Livi's work published around its release, Franz Boas's critique stands out. Boas, a pivotal figure in the development of anthropology, came from a

German-Jewish family and experienced antisemitism from an early age. He emigrated to the United States at 29 and spent the rest of his life there. His concluding words in the *Science* (31) review of Livi's work are unequivocal:

> [...] This exhaustive work will always remain the basis of all studies on the anthropometry of the people of the Italian Peninsula [...] (31).

History confirms this assertion.

A prominent focus of Livi's work was the cephalic index, valued for its relative stability and utility in defining the concept of *race* (as understood in the scientific and anthropological context of the time). The formula for calculating the cephalic index was:

$$\frac{\text{Maximun Biparietal Diameter}}{\text{Maximum Longitudinal Diameter}} \times 100$$

For classifications, nomenclature, and their evolution, we refer back to the introduction. At this point, it is essential to address the characteristics of the instruments used for cephalometric measurements.

Instruments of measurement

The challenge of externally measuring diameters was not unique to anthropology and was also encountered in obstetrics. Specialized instruments, such as pelvimeters, were therefore available.

The most renowned was designed by Jean-Louis Baudelocque (1745–1810), an eminent obstetrician of his era (32). Baudelocque's interventionist approach, characteristic of mechanical obstetrics, was criticized by proponents of natural childbirth (33).

The Parisian surgical instrument maker Louis-Joseph Mathieu (1817–1879) (34) marketed a modified Baudelocque's pelvimeter (Figure 7), adapted for anthropometric use by Broca (35). The importance of surgical instrument manufacturing has been recently reassessed, emphasizing its methodological and material culture significance (36, 37).

Mathieu's model (Figure 8) was reproduced by Salvatore Guida in his 1879 publication (24).

Despite its utility, the compass could yield inaccurate measurements due to insufficient expertise among operators. Consequently, Mathieu marketed a simpler, more reliable instrument: the *cadre à maxima*. Its use was intuitive, and the tool could be made of durable wood or metal. The standard version, made of wood, was prone to wear but was easy to construct and replace. For some of his measurements, Livi used a metallic *cadre à maxima* (Figure 9).

Regarding the history of anthropological instruments (38), another instrument, suitably modified, could serve as a compass for cephalometric measurements (Figure 10). Replacing the tips of a caliper with curved branches yielded results comparable to those of standard compasses. The 299,355 measurements analyzed by Ridolfo Livi were conducted using the standard wooden *cadre à maxima*.

Places and populations

From the distribution of cephalic index values, Livi observed a clear tripartition of the national territory (Figure 11) (39).

Northern Italy (especially its Alpine region) and Southern Italy represented the extremes of the distribution, while the central part of the country appeared to exhibit a blend of these two realities.

Districts shaded in blue indicate areas with cephalic index values exceeding the national average for the Kingdom of Italy (82.73), representing relative brachycephaly. Districts shaded in red indicate values below the national average, reflecting relative dolichocephaly. The intensity of the shading correlates with the deviation from the national mean.

At the level of *Compartimenti* (today called *regions*) (excluding the islands of Sicily and Sardinia to avoid distortions due to insularity, especially pronounced in Sardinia), Piedmont had the highest average cephalic index (85.9), while Calabria had the lowest (78.4).

From this observation, Livi quickly inferred the existence of distinct anthropological and ethnological realities.

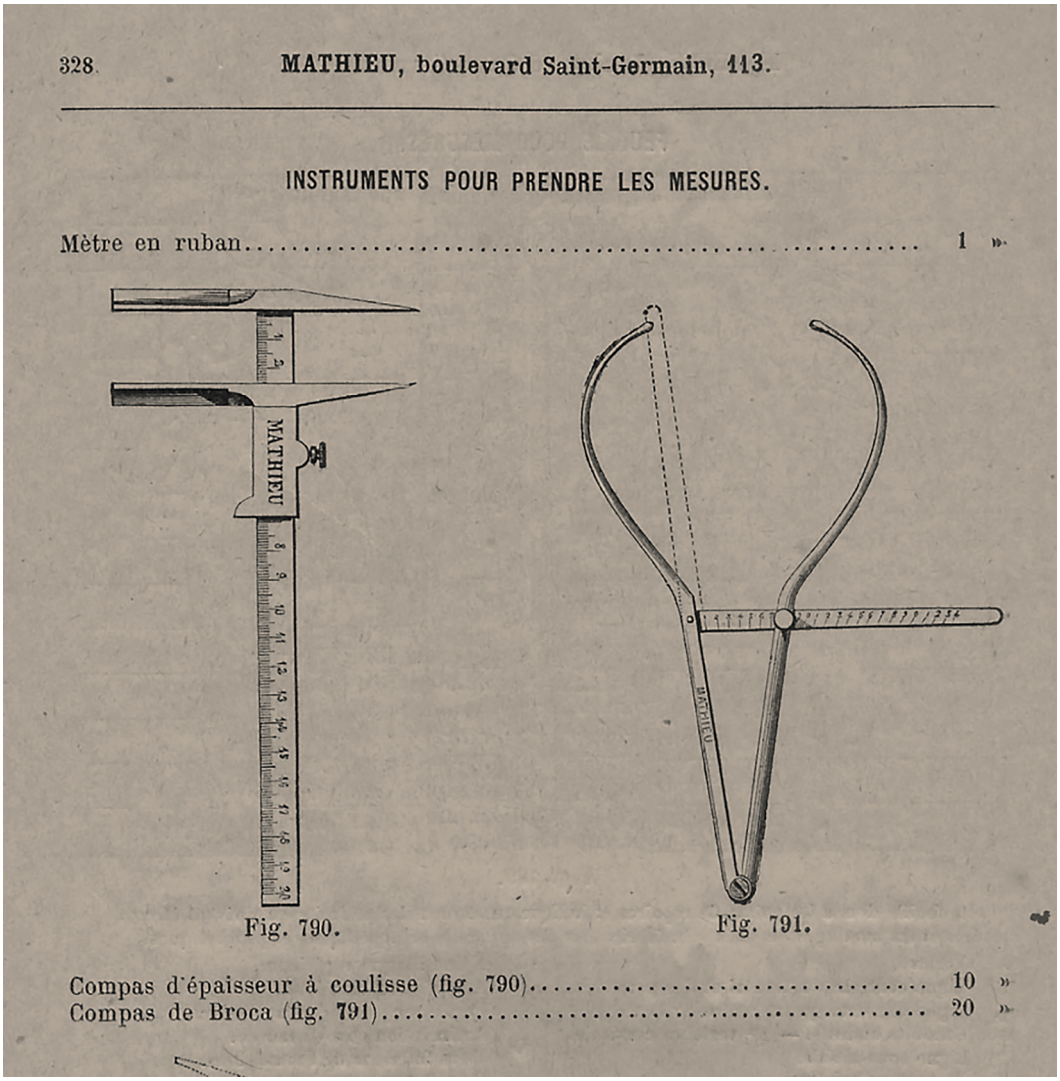

Figure 7. Anthropometric instruments (35).

Within these seemingly homogeneous regions, however, countertrends were observed: dolichocephalic areas among the brachycephalic populations of Piedmont and brachycephalic pockets among the dolichocephalic populations of Calabria. This latter phenomenon was also noted in Apulia and Sicily. The populations inhabiting these areas were identified as *minorities*, specifically the Waldensians in Piedmont and the Albanians in Calabria, Apulia, and Sicily.

All these data were substantially accepted also by Franz Boas and Helene Marie Boas (1888-1963) (40).

The Waldensians: a measurable minority

While Livi paid limited attention to the Albanians, his interest in the Waldensians was markedly greater. Another military physician, Giuseppe Mendini, had previously studied the Waldensians (41) from an anthropometric perspective, analyzing data from the districts of Pinerolo and Susa, where he had been stationed *for professional reasons*.

Giuseppe Mendini is remembered for his *Hygienic Guide to Rome* (42), an interesting work later translated

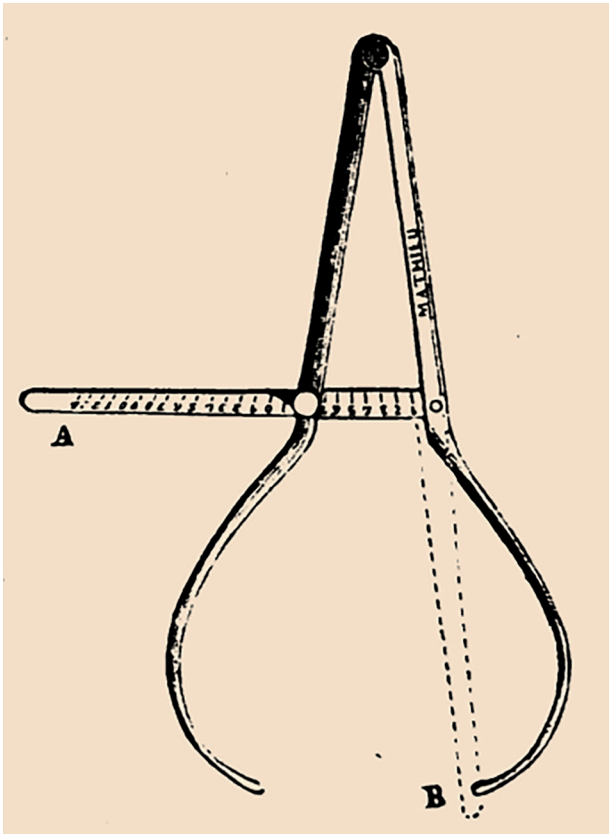

Figure 8. The *Anthropometric Compass* (24).

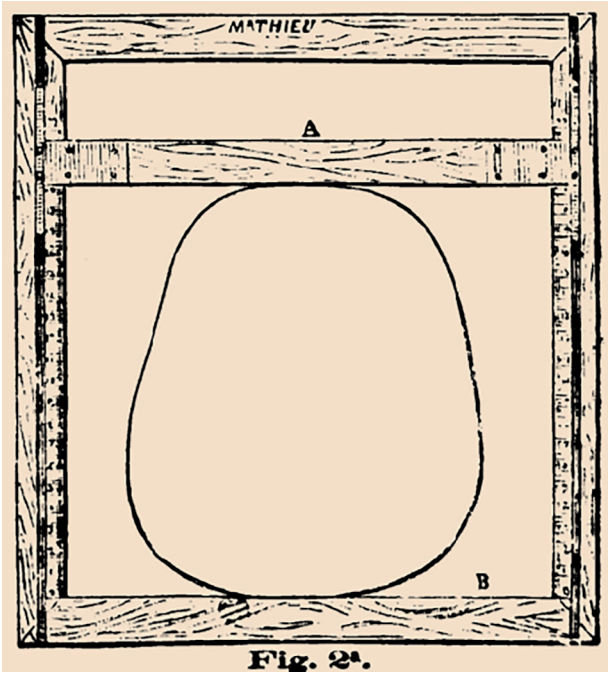

Figure 9. The *Cadre à Maxima* (24).

into English (43) by John J. Eyre - a climatologist (44) residing in Italy - and for a historical review of the Italian Red Cross (45).

Mendini pursued a military medical career, serving in the Italian Red Cross as a medical colonel and senior medical inspector. During World War I, he co-authored with Paolo Fiora (1877-1955) (46) a *Manual of Medications* for use in Territorial Hospitals of the Italian Red Cross (47).

Mendini also engaged in public health initiatives, publishing a popular pamphlet on *lightning strikes* under the auspices of the Royal Italian Society of Hygiene (48). He was also an otolaryngologist in Bologna.

Mendini's observations on the Waldensians were inspired by Livi's 1886 work on the cephalic index of Italians.

Mendini conducted 253 measurements on soldiers from the Pinerolo district and 121 on soldiers from the Susa district, recording relative dolichocephaly in the subdistricts of the *Waldensian valleys*: Perosa, Perrero, Torre Pellice, San Secondo, and Luserna (Figure 12).

He identified this dolichocephaly (using data from the predominantly Catholic Susa district as a control) as indicative of a *"special race that had taken refuge in these valleys to escape religious persecution"* [*razza speciale ivi rifugiatavi da secoli per rifuggire alle persecuzioni religiose*] (41).

These were the Waldensians.

He, however, did not go further into the analysis.

While Mendini stopped short of further analysis, Livi's interest in the phenomenon was far greater. Unlike Mendini, who meticulously recorded subjects' religious traditions, Livi acknowledged that inaccuracies often arose in the general records of the 299,355 health files he examined, with non-Catholics frequently misclassified as Catholics. To address this, Livi focused on municipalities with exclusively or predominantly Waldensian populations and those with mixed populations of Waldensians and Catholics.

This approach provides insight into which municipalities were considered authentically *Waldensian* at the time: Bobbio Pellice and Villar Pellice in the Torre Pellice subdistrict; Angrogna and Rorà in the Luserna subdistrict; Prarostino, San Germano Chisone, Rocca Piatta, and Pramollo in the San Secondo subdistrict;

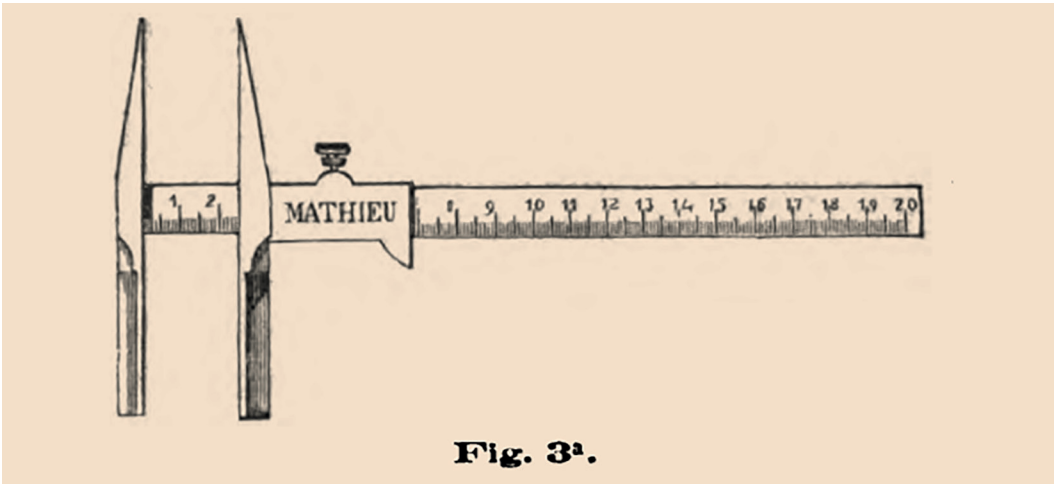

Figure 10. The Caliper (24).

Faetto, Maniglia, Chiabrano, Massello, and Praly in the Perrero subdistrict; and Pomaretto in the Perosa subdistrict.

The mixed-population municipalities included the subdistrict capitals Torre Pellice, Luserna, and San Secondo, as well as Pinasca in the Perosa subdistrict.

Livi reported a cephalic index of 83.7 in 156 observations from Waldensian municipalities and 85.5 in 180 observations from mixed municipalities. The overall cephalic index for the Pinerolo district (based on 1,521 observations) was 86.2.

This allowed Livi to succinctly recount some historical events of the Waldensians. He also included observations on the German-speaking populations of the Gressoney Valley, Formazza Valley, and Valsesia (the *Walser*).

Piedmont thus emerged as a region where minority identities were anthropologically significant, as demonstrated by the cephalic index.

The peculiarities of the Waldensians could also be applied to analyses of certain populations in Calabria.

In addition to the previously mentioned Albanian communities, historical and geographical records documented the presence of Waldensian communities in Calabria, centered around the municipality of Guardia Piemontese (also known as Guardia Fiscalda or Guardia Lombarda), which was almost entirely massacred in 1561. Drawing on authoritative Waldensian historiography (49), Livi reported that 1,600 Waldensians survived the 1561 massacre. However, the hypothesis of residual Waldensian characteristics, as evidenced by the cephalic index, was not supported by Livi's observations.

While the Waldensian minority deserved detailed treatment for its historical role in the Duchy of Savoy, the Kingdom of Sardinia, and the Kingdom of Italy, other minorities (e.g., German-speaking Alpine populations, Slavs, Albanians, Grecanici, Ligurians of Carloforte, Catalans of Alghero) also merited mention. Among these, another minority emerged as a subject of anthropometric analysis: the Jews.

Jews: An unquantifiable minority?

How many Jews lived in the Kingdom of Italy? How many military health records could be attributed to them? In the 1881 general population census, 36,239 Jews were recorded out of a population of 28,953,480—approximately 0.125%. Of the 299,355 health records examined by Ridolfo Livi, only 34 were attributed to Jewish soldiers, equating to 0.011%. What conclusions could be drawn from such scant data?

Livi asserted:

> […] *It is certain that even in areas where Jewish colonies are more numerous—Rome, Livorno, Ancona,*

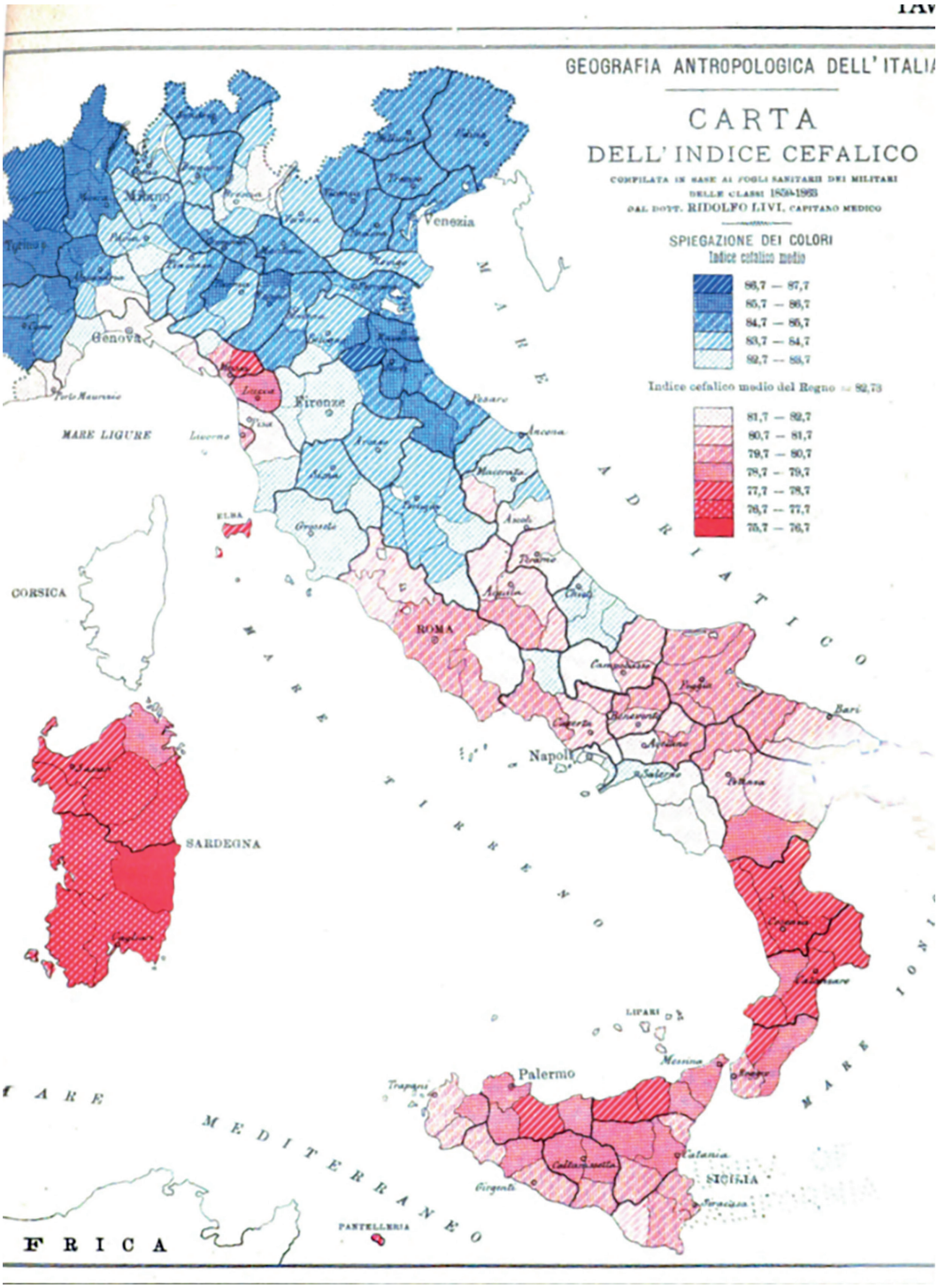

Figure 11. Map of the *cephalic index* (39).

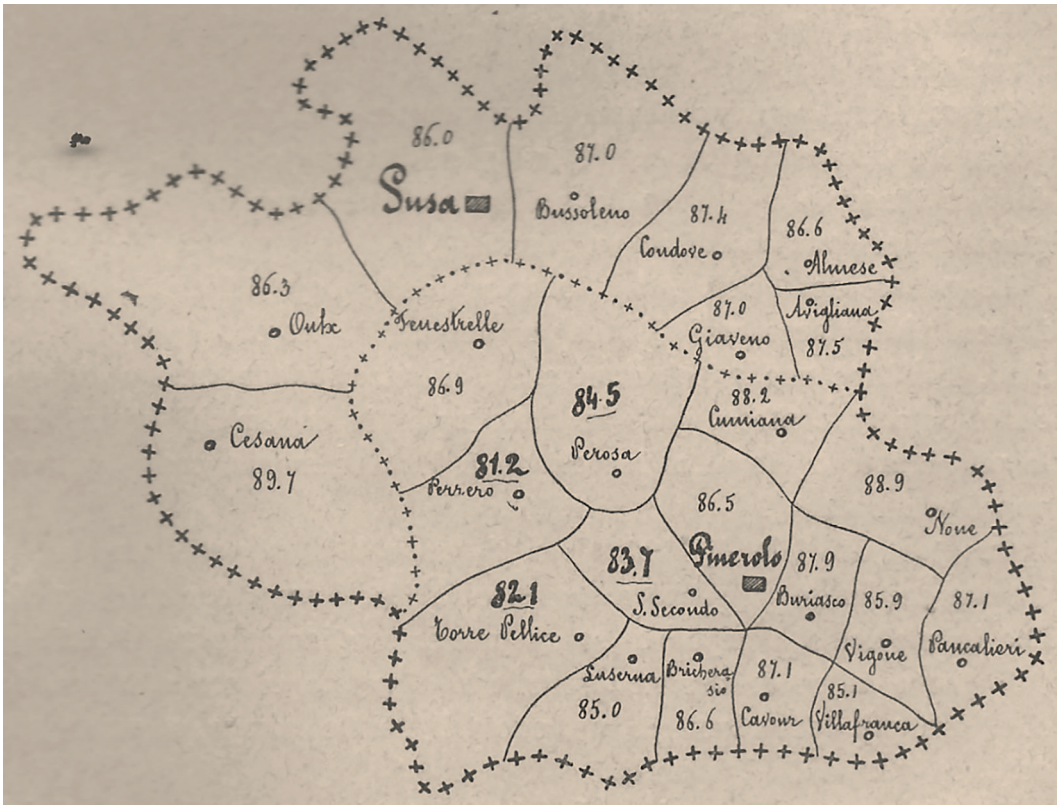

Figure 12. The cephalic index in the Waldensian Valleys (41).

etc.—the general results could not be significantly altered by the inclusion of a few dozen Jews [...] *In a study like this, which reflects the entire population of the Kingdom in its current state, it seemed unreasonable to separate one of the many races or varieties constituting the nation simply because it has mixed less with the surrounding population. Excluding Jews would be as unjustifiable as excluding Albanians or Greeks in Sicily and Calabria, Waldensians in Piedmont, or Ligurians from Carloforte and Catalans from Alghero in Sardinia* [...] *As the Jews are dispersed across a vast portion of the Italian territory, we found it more appropriate to present the results of our research separately* […]

[…] *si può esser certi che anche nelle località dove le colonie isdraelitiche sono più numerose: Roma, Livorno, Ancona ecc., i risultati generali non potrebbero essere alterati sensibilmente dall'aggiunta di poche diecine di isdraeliti* […] *in uno studio come questo, che riflette tutta la popolazione del Regno quale si trova attualmente, parve che non fosse ragionevole il separare dalle altre una sola delle tante razze o varietà costituenti la nazione, solo perché è quella che meno delle altre si è mescolata colla popolazione ambiente. Tanto avrebbe valso lo escludere dalla statistica della Sicilia e della Calabria gli Albanesi o i Greci; da quella del Piemonte i Valdesi, da quelli della Sardegna i Liguri di Carloforte, o i Catalani di Alghero* […] *essendo gli Isdraeliti dispersi in una vastissima parte del territorio italiano, ci è parso più conveniente di esporre a parte il risultato delle ricerche che abbiamo potuto fare* […] (25)

Nonetheless, Livi claimed he could identify among Jews "*a shorter-than-average stature, a slightly dolichocephalic cranial type, darker pigmentation, and an aquiline nose*" [*una statura alquanto al disotto della media, un tipo del cranio leggermente dolicocefalo, un tipo di colorazione piuttosto bruno, e il naso a forma aquilina*] (25).

Given Livi's willingness to draw such conclusions, it is plausible that other motivations were at play.

Some of these motivations align with the anthropometric trends of the time. For instance, Livi stated that his observations corroborated the findings of other researchers who had studied larger Jewish populations, such as those in Austria.

Others, such as the emphasis on Jewish reluctance to *intermarry* with surrounding populations, appear more rooted in anti-Semitic prejudice than in scientific evidence.

Further evidence of such biases emerges in an unrelated analysis of cephalic index and professional occupations:

> […] *If, for example, in a predominantly brachycephalic city a large colony of Jews (generally more dolichocephalic) were found and the cephalic index was analyzed by profession, it is certain that, given the Jews' pronounced aptitude for commerce, the cephalic index of merchants would be smaller than that of any other profession* […]
>
> […] *Se, ad esempio, in una città a popolazione brachicefala si trovasse una colonia molto numerosa di ebrei (in generale piuttosto dolicocefali) e si cercasse l'indice cefalico secondo le professioni, è certo che, data la grandissima attitudine al commercio degli israeliti, si troverebbe che l'indice cefalico dei negozianti sarebbe più piccolo di quello di qualunque altra professione* […] (25)

The themes of separation from the surrounding context, the aquiline nose, the anthropological classification of Jews, and their professional pursuits reflect persistent prejudices. These would later crystallize, becoming paradigms for their social separation, persecution, and ultimately, extermination.

Jews: A measurable minority

The measurability of Jews, as well as their measurement, was not merely an anthropological or anthropometric issue.

Quantitative data and statistical analyses were sought to mitigate the risks associated with predominantly qualitative assessments.

This represented an enduring challenge, particularly for the nascent field of *social sciences*.

Enter Livio Livi (1891–1969) (50), son of Ridolfo Livi, who in 1918 published the first of two volumes titled *Gli Ebrei alla luce della statistica* [The Jews in light of statistics] (51).

Livio Livi, a statistician, anthropologist, demographer, sociologist, and economist, pursued a distinguished academic career at institutions including Cagliari, Modena, Trieste, Florence, and Rome.

The impetus for Livio Livi's research appears steeped in bias:

> […] *The cause that prompted my work was a thorough investigation of a phenomenon known to all but insufficiently explained—the disproportionately high number of Jews who, in Western Europe, have risen to the highest echelons of society compared to the numerical insignificance of the Jewish population itself* […]
>
> […] *la causa che mi spinse al lavoro fu un'accurata indagine sopra un fenomeno a tutti noto ma non sufficientemente spiegato, cioè quello della fortissima proporzione di Ebrei saliti, nei paesi dell'Europa occidentale, ai gradi più elevati della Società in confronto della esiguità numerica della popolazione israelitica stessa* […] (51)

While this initial premise is highly contentious, Livio Livi's work expanded into a broader historical, demographic, and pathological analysis.

From an anthropological perspective, one can question whether and how the *cephalic index* was utilized in this context.

Livio Livi's reliance on his father's foundational work is apparent and unavoidable given the significance of Ridolfo Livi's contributions to anthropology.

Using *military conscription records* (rather than health records), Livio Livi identified Jewish individuals through onomastics, a method fraught with potential errors. This does not undermine the contributions of Jewish onomastics, which continues to yield significant insights (52, 53).

Like his father, Livio Livi considered the cephalic index the *most reliable racial marker* (51).

However, the limited data available in Italy compelled him to reference his father's *Antropometria Militare* and studies conducted by Cesare Lombroso (1835–1909) (54) on Turin's Jewish population (55). Lombroso, known for his work in *criminal anthropology* (56), approached his studies on Jews through a similar lens.

Moreover, Lombroso's statistical elaboration of the results of the craniometric measurements on the sample of Turin Jews (the cephalic index) was soon recognized as erroneous (57).

Livio Livi argued that the relative uniformity of the cephalic index among Jews indicated their *ethnic purity*.

Could one, therefore, delineate for the Jews an ethnic individuality?

For Livio Livi, the answer was positive, and it was precisely the cephalic index, which was particularly homogeneous, as far as variability was concerned, among apparently very different groups of Jews (Sephardim, Ashkenazites, Jews of Asia) that confirmed this.

Livio Livi concluded that Zionism would lead to the emergence of a homogenous Jewish population, benefiting global civilization:

> […] *As a moral force for the reconstruction of the Jewish people, one must consider not only shared religion and historical experiences but also, perhaps foremost, shared blood.*
>
> *If one day the Zionist dream were to become reality, allowing different nuclei to amalgamate and erase the last vestiges of environmental differences, the civilized world would gain a uniquely homogeneous collaborator*[…]
>
> […] *Come forza morale per la ricostituzione del popolo israelitico deve dunque porsi non solo la comunanza della religione e delle vicende storiche, ma anche, e forse in primo luogo, la comunanza del sangue. E se un giorno il sogno sionista dovesse trasformarsi in realtà, dopo che il tempo avesse dato modo ai diversi nuclei di amalgamarsi e di distruggere le ultime conseguenze dei differenti ambienti, il mondo civile troverebbe per nuovo collaboratore un popolo spiccatamente omogeneo* […] (51)

This is a positive conclusion and hope: among other things, the issue of national minorities had forcefully come to the fore, at least in Europe, after the First World War and following the remodeling of European states, with the birth of new states (such as the Czechoslovak Republic or the Kingdom of Serbs, Croats and Slovenes).

The situation of the Jews, different in the various European states, had also been the object of interest, even regulatory (58).

We will see how of the span of fifteen years everything will be reversed, making Livio Livi's work even a cornerstone of Italian fascist racism.

The *cephalic index*: Measuring to persecute

As mentioned, Livio Livi used onomastics to identify Jews for his studies.

Notably, a seminal contribution to Jewish onomastics was published in 1925 (59) by Samuele Schaerf (1899–1985), a scholar from Czernowitz (then part of Austrian Bukovina) who later resided in Rome. Schaerf's work, while initially recognized within Jewish scholarly circles, was soon criticized for its limitations. Within a few years, everything changed.

It has often been argued that the development of Italian Fascist racism was to develop relatively quickly around 1938, the year of the promulgation of the so-called *Racial Laws*, which excluded Jews from the Italian social milieu and began their persecution.

In fact, anti-Semitism, which had polluted Italian life for centuries (if not millennia), had also been declined by Fascist exponents in racist terms from the earliest days of their movement's development: think, for example, of the figure of Roberto Farinacci (1892-1945) (60).

In 1938, Schaerf's list of Jewish surnames became a powerful tool for anti-Semitic propaganda, legitimizing the regime's racist agenda. Its scholarly and editorial origins lent it a veneer of credibility, rendering it difficult to challenge.

In fact, we know that the racist legislation also focused on reducing the surname to a stigmatizing, infamous mark, so much so that provision was made for non-Jews bearing a surname considered Jewish or for *discriminated* Jews (to whom the so-called *Racial Laws*

did not apply) to opt to change their names voluntarily (e.g., with their mother's surname). Conversely, Jews bearing non-Jewish surnames were mandated to adopt their *original* Jewish names (61).

Thus, the cephalic index, surnames, and other markers of identity were weaponized to isolate, marginalize, and ultimately persecute Jews within Italian society.

Returning to Schaerf's work, its scientific framework was unnecessary for propaganda purposes. Instead, it was transformed into an alphabetical list of *Jewish family names*—a sort of *vademecum* or pocket guide, only a few pages long, designed for widespread and inexpensive dissemination (62).

This propaganda effort was undertaken in 1938 by Giovanni Preziosi (1881–1945) (63).

Preziosi, a former priest and prominent figure in Italian fascist racism, was also responsible for the first Italian translation of the infamous anti-Semitic text, *Protocolli dei "Savi Anziani" di Sion* (The Protocols of the Elders of Zion) (64), published in 1921. Initially dismissed as crude and unreliable, the Protocols gained renewed prominence among Italian racists after 1938. Subsequent editions and reprints ensured its widespread diffusion.

Preziosi incorporated the alphabetical list of *Jewish surnames*, derived from Schaerf's work, into his 1938 edition of The Protocols of the Elders of Zion (65).

This left no doubt about Preziosi's anti-Semitic and racist convictions.

While surname identification had inherent weaknesses, a more "scientific" and ostensibly objective method of identification had long been available: Livio Livi's work, particularly his cephalic index, offered a seemingly reliable tool for recognizing Jewish individuals. By simply omitting the positive conclusions from Livi's analysis, the work could be reframed as a "*highly useful manual for identifying the characteristics of Jews, especially Italian Jews*" [*volume di grandissima utilità per conoscere le caratteristiche degli ebrei specialmente italiani*] (66).

This racialized reinterpretation of Livi's work was promoted by two of the most extreme proponents of Italian fascist racism: Guido Landra (1913–1980) and Giulio Cogni (1908–1983).

Guido Landra was one of the ten signatories of the 1938 Manifesto of Race, which publicly formalized Italian fascist racism (67).

The manifesto was not only published in daily newspapers but was also included in an encyclopedic work on *anthropology and psychiatry* edited in 1940. Landra handled the anthropological section, while the psychological section was curated by Father Agostino Gemelli and Ferruccio Banissoni (68).

The first part of the volume, dominated by anthropological content, was overtly racist. The second part, significantly shorter, appeared more balanced, even citing and validating Jewish authors who had been banned under the 1938 *racial laws*.

Father Agostino Gemelli (born Edoardo Gemelli, 1878–1959) was a prominent figure in the development of Italian scientific psychology and neuroscience. A direct student of 1906 Nobel laureate for Medicine and Physiology Camillo Golgi (69-71), Gemelli played a significant role in 20th-century medical and psychological advancements (72).

Ferruccio Banissoni (1888–1952), hailing from Trieste, exemplified the Central European tradition of medicine, psychology, and psychotherapy (73).

In contrast, Giulio Cogni was considered a leading figure in Italian fascist racism. However, his extreme views, closely aligned with German National Socialist racism, eventually led to his marginalization (74).

Livio Livi's work, therefore, was well-suited to fascist racist ideology.

Landra and Cogni included a bibliographic entry for the first volume of Livi's *Gli Ebrei alla luce della statistica* [The Jews in light of statistics] in their 1939 *Piccola bibliografia razziale* [Small racial bibliography], dated to 1933.

However, searches of Italy's National Library Service (OPAC) and the Karlsruher Virtueller Katalog (KVK) reveal no editions of Livi's work beyond the original 1918 publication. The claim of a 1933 edition may thus stem from an error in dating or printing.

Arianna Leonetti (75) also attested to the existence of a second edition but only based on the *Piccola bibliografia razziale* of 1939. Until concrete evidence of such an edition emerges, the possibility of a misdated or non-existent publication remains.

Even before the enactment of the 1938 *racial laws*, the utility of Livi's work for racist and anti-Semitic purposes had been recognized (76) by Telesio Interlandi (1894–1965) (77), a prominent figure in fascist racism.

Interlandi edited the biweekly journal *La Difesa della Razza* [The defense of the race], a mouthpiece for radical racism and anti-Semitism, published from August 5, 1938, to June 20, 1943 (78).

In the June 20, 1942 issue, dedicated to *Jewish labor*, Landra published an article titled *Indice cefalico degli ebrei* [The cephalic index of Jews] (79). The article sought to uphold the cephalic index as a valid racial marker, despite mounting evidence challenging its scientific legitimacy.

Landra argued for a dynamic rather than static interpretation of the cephalic index—a position that, in retrospect, reveals its inherent weakness.

Landra's interpretation was also based on Dornfeldt studies (80).

Walter Dornfeldt (1900-1996) lived in the GDR after the Second World War, holding important positions in the educational field (81).

When this approach faltered, Landra reverted to Livi's work to reaffirm Jewish otherness in contrast to the *Italian race*.

In the July 5, 1942 issue, dedicated to celebrating the 1938 *Manifesto of Race*, excerpts from Livi's work appeared under the title *Gli ebrei non appartengono alla razza italiana* [Jews do not belong to the Italian race] (82).

These excerpts, drawn from the fifth chapter of Livi's work on the *ethnic individuality of Israelites*, omitted any references to past or present intermixing of Jews with surrounding populations. Similarly, the original positive conclusions about Jews and their contributions to civil society were entirely excised.

Do these events cast a shadow on Livio Livi's legacy?

While we refrain from making such a claim, it is notable that authoritative literature on Livi (50) rarely mentions his two volumes on *Gli Ebrei alla luce della statistica* [The Jews in light of statistics]. When cited (83, 84), there is a marked avoidance of discussing the distorted and racist uses to which his work was subjected.

Conclusion

The cephalic index, once a cornerstone of physical anthropology and a tool for classifying human variation, has experienced a journey marked by scientific ascendancy, ideological distortion, and eventual rehabilitation. Introduced in the 19th century as an objective measure for categorizing cranial shapes, its initial promise as a neutral anthropometric tool soon gave way to misuse within broader socio-political frameworks. The association of cranial morphology with racial hierarchies and presumed intellectual capacities exemplifies the dangers of conflating biological data with value-laden social constructs.

This historical trajectory underscores the importance of preserving the memory of the cephalic index's controversial past. By examining its role in shaping scientific and societal views of human diversity, we gain critical insights into how objective measures can be appropriated for biased purposes. This reflective process serves as a cautionary tale, reminding us that the misuse of scientific tools can perpetuate harmful ideologies under the guise of empirical rigor.

In its modern application, the cephalic index has been stripped of its racialized connotations and repurposed within medical and clinical contexts, demonstrating the potential for scientific redemption. Yet, the lessons of its history demand vigilance to prevent the recurrence of distorted uses. Anthropology, as both a scientific discipline and a lens for understanding humanity, carries the responsibility of ensuring that its tools are employed ethically, inclusively, and with an awareness of their broader implications.

By tracing the rise, fall, and repurposing of the cephalic index in Italy, this study underscores the enduring need for critical reflection within scientific practice. The legacy of the cephalic index is both a testament to the power of scientific inquiry and a reminder of its vulnerability to misuse—a duality that must guide the future endeavors of anthropological and medical research.

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Correspondence:
Lucie Biehler-Gomez
Dipartimento di Scienze Biomediche per la Salute, Università degli Studi di Milano, via Mangiagalli 31, 20133, Milano
E-mail: lucie.biehler@unimi.it