# Intersex/Gender-Related Constitutiveness: Specific Realities, Specific Norms[1]

*Simon Zobel*

## Summary

Life loves diversity and is geared towards variation. Variability and complex systemic strategies are a fundamental prerequisite of life. Already in terms of physical biology all human beings can be regarded as variable or polyvalent in terms of sex/gender. The elements constituting sex occur equally in all bodies. Variable factors on the genetic, cellular as well as organic levels and different hormonal proportions in the life cycle of all human beings condition a more or less developed sex-related specialization. Some are more polyvalent than the average. These are today generally referred to as intersexual. Following traditional scientific standards and categories on the basis of classical dichotomies, disorder is assigned to these large minorities, thus making the physical image treatable. Physical and psychological integrity is violated. Initially excluded from normality, these people are later included again via special arrangements, thus keeping existing scientific and cultural suppositions reproducible.

## Introdution

There are new approaches and worldviews in the natural sciences and engineering that are based on multilayered and complex systemic approaches and can also enrich the social discourse on (inter-)sex/gender-related constitutiveness (Goode/Machol 1957; Ramo/St.Clair 1998). What Western scientific thought has taught us since the 18th century can also frequently be reflected in the realm of sex/gender-related constitutiveness. Politically and in terms of human rights ever more concessions are being made regarding the right to physical integrity and self-de-

1 | Original version in German.

termination, but for the moment renowned representatives of medicine and medical research will continue to have the last word in the field of practice. (Inter-)sex/gender-related constitutiveness should be regarded as a social cross-sectional issue, since it is thematically linked to the norming of bodies on the basis of traditional cultural, secular or religious notions and categories.[2] Even more than 200 years after Enlightenment societies can still be marked by myths and rituals (Levi-Strauss 2013). This also concerns sex and gender. Also from a scientific point of view, medicine – primarily a science of pathologies (pathological and abnormal processes and conditions in the body and their causes) and of prevention – should not be conceded the sole expertise. This is the point of departure of the following contribution which also aims to show how disease is constructed in practice and made treatable with limiting paradigms. Sex/gender is like many other things not monocausal or one-dimensional. Variables and steady states co-exist together with a whole range of contingencies and strategies. The multi-dimensional peek over medicine's fence to living, complex systems beyond the old paradigms is also worthwhile with regard to sex/gender and the evolutionary adventure of the human being. The natural sciences are perfectly capable of providing new answers across the disciplines. An exponent of new approaches who is today as thought-provoking as he was in his time is the much quoted evolutionary biologist Haldane who famously remarked that the universe is not only queerer than we suppose, but queerer than we can suppose (Haldane 1928).

## The crux with categories and applying them

A team of researchers around Veyrunes (Veyrunes et al. 2010) at the Institut des sciences de l'évolution/CNRS, Montpellier observed in the fertile female mice of the African free ranging mouse population Mus minutoides in 75 to a 100 % of the cases an XY karyotype. Mice are genetically closely related to human beings which is why they are frequently used in transgenetic research. This example is worth mentioning because in the current medical view this constitutes a XY sex reversal. The female mice are genetically male. What is rarely mentioned is that something similar also exists in human beings. At the 8th Berlin Symposium for Pediatric and Adolescent Gynecology a case study was presented on 19 April 2013 involving a so-called complete androgen insensitivity syndrome (CAIS) with persistence of Mullerian structures such as uterus and ovaries as well as menstruation (Lehmann-Kannt 2013) on the basis of 46,XY and SRY-positive (chromosomal male).[3]

**2** | See the current debate around circumcision in boys and female genital mutilation in Germany. Rupprecht, Marlene (Germany, SOC), Children's right to physical integrity, Report Doc: 13297, 06/09/2013. Reference: 3912, Motion: 13042 (MRS). Resolution 1952. Recommendation 2023, Eurovoc Council of Europe.

**3** | Apart from the positive sequencing of 46,XY and SRY gene, the diagnosis 'complete androgen insensitivity syndrome' (CAIS) is today frequently already considered to be questionable and has in this case to be understood as a working diagnosis or a diagnosis of convenience.

Simplified genetic shorthand forms such as 46,XY are also used for attributing disorders and for making pathologizing conclusions. All the more reason to look at this in more detail. The majority of sex attributions and thus also diagnoses are based on the gene image identified in standard procedure via the light microscope, which corresponds to the karyogram with one of the so-called sex chromosomes (gonosomes). The term karyotype denotes the totality of all cytologically identifiable chromosomal characteristics of an individual. The karyogram is the schematic representation of the chromosome pairs according to size und form that defines the karyotype. Here the chromosomes are arranged in pairs by diminishing size, followed by the indication of the gonosomes. The so-called genetic shorthand is created as follows: number of chromosomes and finally indication of the gonosomes, e.g. 46, XY (male-systematized) or 46, XX (female- systematized). The genetic test material is usually extracted from amniotic fluid or heparinized blood. The attribution is carried out via the banding pattern characteristic for each chromosome. However, a great deal of genetic information or relevant structural variables remains invisible and cannot be captured by this standard mapping. For this one would need finely structured and more sophisticated molecular tests such as DNA sequencing and micro-satellite analyses as well as testing with tissue (e.g. skin biopsy, tissue biopsy without removal of gonads). The WHO's international statistical classification of disorders and related health problems also systematizes according to female or male malformations on the basis of karyotype and sex attribution in connection with gonads (testes, ovaries or ovotestis). What is generally referred to as intersexuality is categorized as an aberration or disorder of sex development in the WHO's ICD 10[4] according to clinical pictures and diagnosis codes, and corresponding treatments would be able to be billed on the basis of the ICD: ICD 10, chapter xvii congenital malformations, deformations and chromosomal abnormalities (Q00-Q99); Q56 indeterminate sex and pseudohermaphroditism; Q56.0 hermaphroditism, not elsewhere classified. Intersexual and ill would in this way be equated.

## The terms and their etymology

When two clearly demarcated sexes respectively genders are typified, then those persons appear atypical or generally intersexual who cannot be assigned unambiguously to either the female or the male sex in terms of genes (genetical-chromosomal image according to nomenclature), anatomy (internal and external genitals, gonadal as well as gonoductal[5]), hormones/endocrinology (quantitative ratios of

**4** | See ICD-10-GM version (2013). Copyright WHO, DIMDI 1994 – 2013. URL: http://www.dimdi.de/static/de/klassi/icd-10-gm/kodesuche/onlinefassungen/htmlgm2013/index.htm [21.09.2012]. English: www.who.int/classifications/icd/icdonlineversions/en/ [18.05.2015].

**5** | Gonadal: gonads (gonads; ovaries, testes or e.g. ovotestis); gonoductal: gonoducts; spermatic ducts (vas deferens), oviducts, fallopian tubes.

the sex hormones, enzymatic metabolization etc.) as well as the phenotypical interplay of all these factors.

In order to be able talk about sex/gender-related constitutiveness one is obliged to employ terms for biologies of sexes and/or genders whose etymology, vertical historicity and geographical use are not uniform across Europe. If in German one refers to people who cannot be assigned to one sex, usually the term 'intersexuality' is used. These people are sometimes also called intersexuals. Beginning in 1911, Richard Goldschmidt, zoologist and geneticist at the Kaiser-Wilhelm-Institut für Biologie in Berlin-Dahlem researched sex-related forms which he regarded as mixtures between an ideal-typical male and female phenotype. Goldschmidt coined the term 'intersexuality' (German 'Intersexualität') (Dietrich 2003). But since he worked in the United States from 1935 onwards the term came to establish itself internationally. In the English-speaking world the term 'sex' denotes the physical part of the sex/gender model and loses the inevitable connection to sexuality. With Goldschmidt we find however the terminological commingling of intersexuality with transvestitism, transidentity, transgender and sexual orientation (see Dietrich 2003). In French the term 'intersexuation' (from sexuation) is used instead of intersexuality. 'Sexuation' here denotes both the process of biological sex differentiation as well as the process of sex assignment/attribution (Ragland-Sullivan 2004). For the sake of a clearer distinction between inter-sex/gender-related constitutiveness and some trans sex/gender identities we will in the following use the term 'transident' or 'transidentity' when appropriate.

The present contribution aims to show why the terms 'atypical' or 'polyvalent' sex/gender features are preferred over others. 'Atypical' or 'polyvalent' need not necessarily refer to the outer appearance or the external sex features. It here refers primarily to the systematization or the categorization itself. The congenital physical sex-related constitution on a genetic, organic, anatomical or hormonal basis which is systematized as atypical is inert, i.e. stable and congenital. It exists independently of opinions about sex voiced by natural and social sciences and also independent of historical periods.

We should here take a closer look at the prefix inter as a synonym for in-between. All human beings have polyvalent features because elements that constitute sex are bipotent or bilateral in their structure.[6] Hormones (androgens as well as estrogens)[7] do not constitute separate, completely different con-

**6** | Cells are referred to as bipotent when they have the ability to differentiate themselves into two different cell types within one tissue type. Also organs such as gonads are bipotent, being able to develop into testes, ovaries or hybrid forms. Bilateral means on either sides or two-sided. Some organs such as gonads or the lung have a bilateral or two-winged structure.

struction material and their enzymatic docking sites are in various gradations equally present in all human beings (Fausto-Sterling et al. 2000).

The biology of sex/gender-related constitutiveness is usually interpreted in the light of bimorphism, which is assumed to be a condition created by evolution and an optimization of human sex/gender-related constitutiveness (Cuozzo/Bratman 2005). Also the brain as a sex-related organ or as a transmitter or the organization of the brain is often investigated along these lines (Güntürkün/Hausmann 2007). On this basis anything atypical is then often understood as a malformation of binary sex/gender-related constitutiveness or as a less effective or less efficient sex/gender-related constitutiveness. Social-cultural sex/gender relationships often form the basis for science or at least determine how studies are organized or results are read, since also scientific research does not take place in a vacuum removed from social-cultural circumstances and the researchers themselves cannot provide completely objective conditions (Schmitz 2009). Atypical sex(-related) development is therefore hardly ever examined as a specific reality with its own specific norms. Usually people only see what they can and want to recognize. A reason why the evaluation of field research has often come up with surprises with respect to homosexuality in animals. Seemingly heterosexual partners have turned out to be homosexual (Bailey/Zuk 2009). The observation of same-sex sexual behaviour in animals is however used not only as an argument for homosexuality but also against the acceptance of human homosexuality, as a sin against nature (peccatum contra naturam). What is clear here is that the notion of nature or of the natural is used both by progressive and conservative camps as required.

## Creation of minorities and subsequent inclusion phenomena

Atypical or polyvalent physical sex/gender-related constitutiveness as a criterion first depends on the parameters of attribution themselves. One could for instance get the impression that we are here dealing with an infinitesimally small number of individuals or at least with particularities. It is only the sex/gender-related standardizations and the attributions of in-between sexes/genders and of deviations from the norm that create the large overlap of minorities with their corresponding sub-identities. One result of this is that inter sex/gender-related constitutiveness is often discussed in conjunction with issues of equal rights for third sexes/genders. It is then about equal rights for other kinds of identities deviating from the norm such as LGBTTIQ.[8] The other-

**7** | Generally, sex hormones are divided into female (gestagens, estrogens) and male (androgens) hormones according to their function for target organs such as the internal sex(-related) organs. But essentially every human organism produces these hormones, even though in varying proportions.

ness of sex/gender identity, of sex/gender expression or sexual orientation is assumed as the common denominator. This creates an excluded intersection which can be subsumed under other or in-between and which requires special attention both in legal and medical terms. Without the previous exclusion from normality the subsequent recognition or equalization would not be necessary. Bi, gay or lesbian refers to the sexual orientation or sexual identity deviating from the norm.

In this attribution process intersex persons are classed with the group of deviating physical sex/gender-related constitutiveness or physical sex-related identities. Inter sex/gender-related constitutiveness is however a physical constitution and neither a sexual identity or orientation nor to be equated with transidentity or transsexuality. For intersex people this kind of terminological fuzziness and the subsumption under different and sexual orientation have the effect that important issues such as prenatal diagnostics, compensation for involuntarily performed surgical and hormonal assignment measures, off-label use of drugs[9] as well as the review of medical practice are not addressed. Mixed representations together with transidentity or trans sex/gender-related constitutiveness therefore do not take these important issues into account in a satisfactory way for intersex people.

Intersex persons comprise a rather heterogeneous group that can hardly adequately represent its interests quantitatively in LGBTTIQ contexts, as becomes particularly clear when regarding children and their parents. It is unlikely that parents looking for support would turn to an organization for queer life styles for advice. What is as a rule first of all most important for parents, besides acquiring access to basic information that is also independent from medical practice, is to find access to their child and accept its corporeality (Schweizer/Richter-Appelt 2012). At this point of the parent-child attachment the question of queer life styles may hardly play an important role or have a positive connotation. On the contrary, the connection to different forms of otherness relating to the term 'queer' could make young, inexperienced parents additionally insecure and favour choices for sex disambiguation measures. There only seems to be a minority of adolescent intersex persons that regularly attend LGBTTIQ meetings. The reason for this may be among other things that inter sex/gender-related constitutiveness has so far generally been concealed and that those concerned may not have been aware of it themselves. Finding and living one's own sex/gender or also sexual identity can also be experienced as something particularly intense and conflictual and as a very protracted pro-

**8** | LSBTTIQ = Abbreviation for Lesbian, Gay, Bisexual, Transsexual, Transgender, Intersex and Queer.
**9** | Use of drugs for an unapproved indication.

cess. Many people first have to deal with the chain of imposed clinical histories for themselves personally and also regarding, among other things, the access to documents; often also legal procedures have to be initiated, for instance concerning the civil register. Finding oneself is often an intense, protracted process. This coming of age process[10] can in these cases be more intense than it is already for adolescents. It could also be even more precarious than the often difficult coming of age process of homosexual adolescents. Also as adults, the majority of the so-called intersex people do not necessarily see themselves as part of LGBTTIQ.[11] One should take care that consultation and funds for people systematized as intersex are not allotted in bulk in the framework of so-called gender multiplicity to meanwhile large and powerful LGBTTIQ organizations. As a rule these rarely have detailed knowledge and experiences about medical conflicts or legal or pension-related concerns of intersex persons. There is next to no adequate peer-to-peer support. Associations and cooperations would have to be based on mutual respect and competent distribution of portfolios. But questioning the current models of sex/gender-related constitutiveness and the legal, social and economic exclusions produced in the process is basically positive for everybody. It is the exclusions that produce the later necessary inclusion in the first place, which then in turn follows the dynamics of society.

## Sex/gender biologies, the term of sex/gender identity and the consequences for intersex people

Binary sex/gender-related constitutiveness is generally regarded as the effective mode of reproduction. Social genderizations can however be understood as a cultural product. Regarding women and men as fundamentally different beings is a comparatively young phenomenon in Europe – it did not develop until the 18th century (Laqueur 1990).

Connections between biology and sex/gender(-related) identity as well as sexual orientation are often sought. The term 'gender identity' by contrast comes from psychoanalysis and refers to the social role associated with gender. What was frequently seen as a precondition for the development of a consolidated male or female sex/gender identity was a body image that conforms to it or at least appears to conform to it externally (Money 1955). For the sex development great importance was also attached to a conforming female or male body image (Heigl-Ever/Weidenhammer 1988). This was and is also of key impor-

**10** | Coming of age denotes the transition of an adolescent person from childhood into adulthood. This can constitute a psycho-emotional maturation process, a person's identitary evolvement as well as the physical and psychological experience of puberty (Konrad/Firk/Uhlhaas 2013).

**11** | The author regularly participates in German and international events on the subject of intersex, attends self-help meetings of organizations such as the German Verband Intersexuelle Menschen e.V. and conducts many personal conversations, also across Europe.

tance in sex assignment or recently sex disambiguation measures in physically atypical persons. This has also led to early surgery or prenatal measures being recommended in the case of intersex children.

Hardly anyone of adult intersex people in Europe today has managed to slip unharmed through the tight net of sex/gender-related images, legal insurance protection plus parental care/guardianship in connection with medical recommendations. Therefore there is also little information about untreated persons that could question some of the prophylactic treatment methods and surgery. Renowned scholars of sexology such as Richter-Appelt and Schweizer (2009) do however concede today that, at least from their point of view, the sense and results of the current practices and procedures of assignment ought to be questioned. Also no reliable prognoses can be made about the development of sex/gender-related identity in adulthood (Schweizer/Richter-Appelt 2009). Hormonal and surgical measures are however irreversible. Surgery on the external genitals and on the urogenital tract, partly also on the gonoducts, is very painful. In addition, there is an increased risk of infection. Follow-up surgery is often indicated. Results are too often an alienated body, alienated or painful organs that also in people's subjective perception no longer belong to them (Brinkmann et al. 2007, Bundesverband Intersexuelle Menschen e.V. (2008), Schweizer/Richter-Appelt 2009). The specific problems, anxieties and conflicts of adolescents have up to now received insufficient attention. Hopes that their anxieties and conflicts might be removed through medical measures are generally regarded as failed, as for instance in the Hamburg intersex study of 2007 (Schützmann et al. 2009).

When atypical body-related sex/gender constitutiveness is discussed then this is frequently done in order to question the connection of biologies of sexes and social gender roles in general. It seems useful to question gender as a concept of the social or psychological side of sex/gender and of the social gender roles. One has to note here however that gender discourses in general do not signify any kind of relief for intersex children. Relativization of gender and social roles does not protect from surgical measures such as the removal of the gonads (gonadectomy) and of ovarian or testicular tissue or from so-called genital normalizing surgery. Inter sex/gender-related constitutiveness is often seen as a disorder of sex development and the measures are identified as medical therapies or a prophylaxis.[12,13] A majority of intersex children can today

**12** | See guidelines of the Gesellschaft für Kinderheilkunde und Jugendmedizin (DGKJ). Arbeitsgemeinschaft Pädiatrische Endokrinologie (APE) as section of the Deutsche Gesellschaft für Kinderheilkunde und Jugendmedizin (DGKJ) as well as the Deutsche Gesellschaft für Endokrinologie (DGE). Workgroup Disorders of Sex Development (DSD) of the APE. Disorders of sex development. Authorized for electronic publication: AWMF online. URL: http://www.awmf.org/uploads/tx_szleitlinien/027-022l_S1_Stoerungen_der_Geschlechtsentwicklung_2010-10.pdf [10.10.2010].

experience a more open, playful approach to gender roles. 90% of the infants whose parents are organized in the Bundesverband Intersexuelle Menschen e.V. had, to my knowledge, nevertheless received gonadectomy.[14]

## Classes of inter sex/gender-related constitutiveness?

In October 2005 the consensus conference of Lawson Wilkins Pediatric Endocrine Society (LWPES) and the European Society for Paediatric Endocrinology (ESPE) took place in Chicago, USA. The result was the so-called Consensus Statement on management of intersex disorders (Hughes et al. 2006). Instead of the hitherto used terms of 'intersexuality' or 'hermaphroditism' the term Disorders of Sex Development, DSD (German: Störung der Geschlechtsentwicklung) was introduced. This now subsumes all atypical forms of body-related sex/gender constitutiveness, regarding them as disorders or malformations. Sex/gender assignment surgery continues to be recommended, even though it is admitted that "no one technique has been universally successful". A precondition for surgery should be an accurate diagnostics and prognosis of later sex development. However, "functional outcome" should be given preference over "a strictly cosmetic appearance" (Hughes et al. 2006). The question whether treatment possibilities have really been reduced cannot be answered at the present. It is however doubtful whether intersex can be optimized at all within a framework of binary sex/gender-related parameters. Together with the WHO's International Classification of Diseases (ICD) the consensus paper constitutes an effective tool to subdivide inter sex/gender-related constitutiveness and make some forms of body-related sex/gender constitutiveness treatable. The ICD features the categories of hermaphroditism (true hermaphrodite) as well as female and male pseudo-hermaphroditism (pseudo hermaphrodite). Other physical conditions are not classified in this form but listed, for example, under endocrinological disorders. The ICD serves to encrypt diagnoses and is also used for billing inpatient services. In the case of atypical body-related sex/gender constitutiveness the diagnosis can thus first be found and the diagnostic and treatment facilitated. This division also has the effect that operative or hormonal treatments can be declared as sex disambiguation measures independently from the rest of a person's body image, identity or personal sex/gender-related experience. According to this formula also those persons with an atypical physical sex need to have themselves evaluated according to the

**13** | See university clinic Heidelberg. Urology. Störung der Geschlechtsdifferenzierung III. Chirurgische Therapie des Intersex. URL: http://www.klinikum.uni-heidelberg.de/Stoerung-der-Geschlechtsdifferenzierung-III.108328.0.html [10.06.2013].

**14** | See footnote 10.

(German) transsexual law (TSG), who for instance wish to obtain a sex/gender entry independent of their karyotype or who are not considered as real hermaphrodites. In practice there are hardships for intersex people, even though the law actually only calls itself "law for the changing of first names and the establishment of sex affiliation in special cases" and aims to enable a life in the perceived sex/gender. For one thing, the sex/gender can only be changed to the other traditional sex/gender, and secondly, the procedure and the two expertises that ascertain the permanent perception of belonging to the desired sex/gender according to the findings of medical science are very expensive.[15] A disorder of the gender identity is then established.[16] Because of the so-called shadow reports of NGOs such as Intersexuelle Menschen e.V., which were submitted to the UN in the framework of different conventions ratified by the Federal Republic of Germany, the German government instructed the German Ethics Council to prepare a statement on the situation of intersex people in Germany. Genital surgery, the removal of internal sex-related organs and hormone therapies on atypical human beings became a social issue with a broad impact and for a time shifted to the centre of public attention. Even though the German Ethics Council criticizes in its statement 2011 (Deutscher Ethikrat 2012) sex/gender assignment measures and basically recognizes the situation of intersex people it nevertheless follows clinical practice by differentiating between sex/gender-assigning and sex/gender disambiguation measures (e.g. according to karyotype and syndromes). The important discussion about abortion and prenatal diagnostics[17] is still only led along the fringes of the debates. Due to the ongoing progress in molecular-genetic mapping techniques as well as the electronic mapping of clinical files (family anamnesis[18]) the issue of abortion for instance in cases of undesirable chromosome constellations is becoming a hot topic.

Against the background of these recent developments the amendment of the civil register law represents an attempt to provide a deferment of assignment, relief for parents and child as well as space for the child's development. The German Ethics Council considers the obligation to fix the sex/gender to either male or female as "an unjustifiable infringement into the right to pri-

**15** | Act on the Changing of Forenames and the Determination of Sex/Gender Affiliation in Special Cases (Gesetz über die Änderung der Vornamen und die Feststellung der Geschlechtszugehörigkeit in besonderen Fällen) (Transsexuellengesetz – TSG) of 10 September 1980 (BGBl. I S. 1654). Last changed by article by article 1 of the act of 17 July 2009 (BGBl. I S. 1978). URL: http://www.gesetze-im-internet.de/tsg/BJNR016540980.html [10.06.2013].

**16** | See Störungen der Geschlechtsidentität (ICD-10 F64.-). ICD-10-GM Version 2013. WHO (ed.), DIMDI 1994 – 2013. URL:http://www.dimdi.de/static/de/klassi/icd-10-gm/kodesuche/onlinefassungen/htmlgm2013/block-f60-f69.htm [21.09.2012].

**17** | Prenatal diagnostic (PND) denotes examinations of the unborn child (fetus) and pregnant women for the early detection of disorders BJNR016540980.html [10.06.2013].

vacy and the right to equal treatment" (German Ethics Council 2012). After a corresponding decision of the Bundestag from January 2013, § 22 section 3 was inserted into the law which came into effect on 1. 11. 2013. The newly phrased paragraph stipulates: "If the child cannot be assigned either to the female or the male sex then the civil status event shall be entered without such information into the birth register."[19] In one sense, the provision, adopted at rather short notice, points into a positive direction, yet in another it is also a cause for concern. On the one hand this is in effect not a 'can' option but a 'must' provision. On the other, the change does not affect the criteria and standards mentioned in the text, on the basis of which decisions are usually made. It remains for medicine to decide by which criteria the child cannot be assigned to either the one or the other sex/gender and which groups are excluded from this.

## A peek over the fence

Physical sex is not always as rigid, limited and divided in two as is generally assumed, even though it tends to be classified along the current criteria (Kuiper 2001). In Devon in Southeast England a hen is said to have varied its sex spontaneously and became the proverbial rooster in the henhouse (The Telegraph 2008). The zoologists and agricultural scientists Jacob and Mather (2000) assume in their article that in such cases the physical sex change can occur together with spermatogenesis, i.e. the creation of fertilizable sperm. One should however be cautious with citing examples from flora and fauna – as is often done in discourses around inter sex/gender-related constitutiveness. Conclusions about other species such as humans are likewise only possible in a limited way considering the complexity of the processes involved. What is interesting in Jacob and Mather's article is that they interpret the described physical process of change as pathological even in the animal.

It is widely known that in the realm of flora monoecy and hermaphroditism exist beside dioecy.[20] Most blossoms are hermaphroditic. Hermaphroditism in the animal kingdom has already for decades been a subject of scholarly research. Thus a determination or change of the physical sex can occur when required for the survival of the species (Crews 2003) or the gonadal determination occurs under the influence of ecological factors, for instance temperature

**18** | Inter sex/gender-related constitutiveness often has a genetic base and occurs more frequently within one family.

**19** | German original: "Kann das Kind weder dem weiblichen noch dem männlichen Geschlecht zugeordnet werden, so ist der Personenstandsfall ohne eine solche Angabe in das Geburtenregister einzutragen" Federal Ministry of Justice: Personenstandsgesetz (PStG), "Personenstandsgesetz vom 19. Februar 2007 (BGBl. I S. 122), das durch Artikel 3 des Gesetzes vom 28. August 2013 (BGBl. I S. 3458) geändert worden ist". URL: http://www.gesetze-im-internet.de/pstg/BJNR012210007.html [25.11.2013].

(Avise/Nicholson 2011, Reinboth 1975). What is also remarkable is that for a sex-related disposition only in a few cases does there seem to be a direct gonosomal-genetic basis, for instance also in the form of mosaics or chimerism or translocations.[21] The development of internal and external sex-related organs and their changeability is in many cases subject to further sex-determining factors independent of so-called sex chromosomes. For such factors DMRT1 or the DMRT1 expression is, besides others, a probable candidate that leads to the development of male or female sex-related organs. DMRT1 also plays a role in the temperature-dependent male sex-related development in the gonads of some species. In the sex differentiation of vertebrates, animal as well as human, DMRT1 homologous genes are also said to have an important function (Charlesworth 1996, Manolakou/Lavranos/Angelopoulou 2006).

The architecture of physical sex-related structures is subject to a great range of variables that particularly concern the tissue of the ovary and the testes. We can mention here the SOX gene family (Prior/Walter 1996) or the aromatase gene transcription (Ghosh et al. 2009, Pannetier et al. 2006). In mammals the transcription factor SRY which is coded for the Y chromosome is as a rule responsible for the development of indifferent, bipotent gonads to testes instead of ovaries. However, in its absence testes differentiation can occur. One single factor, the transcription regulator FOXL2, is necessary to prevent transdifferentiation of developed ovaries to testis. Induction of FOXL2 can apparently lead to an immediate upregulating of testis-specific genes including the SRY-critical target gene SOX9. The reprogramming of the Granulosa and Theca cell lines occurred consistently to lines similar to Sertoli cells and Leydig cells[22] comparable with those of male siblings. The cells thus changed by themselves from a female to a male mode. The results also show that the conservation of the ovarial type (of the ovaries) is a life-long, active process (Uhlenhaut et al. 2009).

The simultaneous occurrence of ovarial tissue or testicular tissue in one of the two gonads is referred to as ovotestis, or less often, as a hybrid of the two gonads. Interestingly, the testicular tissue seems to occur more frequently on the right side of the body of the (initially bipotent) gonads. The organs are always laid out in a two-winged or bilateral design. It is assumed that a gene mutation on the X chromosome or alternatively on an autosome makes the testis determination possible. In genetics, autosomes refer to the subset of the

**20** | Monoecious = male and female features exist in one individual separate from each other. Dioecious = every individual has either only male or only female features.

**21** | In genetics, translocation (change of place, from Latin locus: place) signifies a chromosome mutation in which chromosome segments have been shifted to another position within the chromosome stock. In extreme cases an entire chromosome can dock onto another one.

chromosomes that does not belong to the sex chromosomes. Here it becomes clear in how far already genetic research itself can be sexed/gendered. In addition, in a few genetically female- systematized 46,XX persons with testis determination a SRY translocation to the X chromosome was observed. However, subsequent examination has revealed the majority of the individuals with the female karyotype 46,XX as being SRY negative. This is particularly interesting since therefore there exists no known testis-differentiating, male-systematized gene. In most cases a typical ovarial function (also menstruation) is further observed. The 46,XX karyotype is said to occur in 60% to 70% of ovotestis – the so-called real hermaphrodites (Guerra et al. 1998, Güitrón et al. 1998, University of Babylon).

## (Inter-)sex/gender-related constitutiveness – specific realities, specific norms

Studies on the research of the Y chromosome or the sex-determining region SRY indicates a development history that has been researched already since the 1960s (Ohno 1967, 1969; Watson/Riggs/Grave 1992). The sex/gender-related as well as general conditions in the realm of life appear to be subject to variable and bipotent parameters which are interlinked in interactive, complex systems. The conditions are neither random nor monocausal. Sex-related hormones, for instance, are classified as such on the basis of their effect. Biochemical building blocks, hormones create each other and are reconstructable. From a specific proportion onwards androgens are changed in all bodies via aromatase to estrogens. Aromatase also plays a role in the differentiation of the ovaries (Duffy et al. 2010). With increased testosterone uptake e.g. in power training, the additional testosterone suppresses the body's own release of androgens in the testes. The testes receive the signal work less which also reduces the spermatogenesis, i.e. the development of sperm cells. From a certain degree of more onwards the aromatase mentioned above triggers the development of breasts. Sex-related hormones do not represent a homogenous class of substances. They comprise steroids which function as hormones, and specific proteins. Varying differentiations according to sex exist in the quantity of produced and free sex-related hormones as well as the body's reactivity to the sex-related hormones which varies depending on other conditions such

**22** | Granulosa cells and Theca cells are an important cell type for the maturation and the function of the follicle (egg cell). Through the influence of the aromatase, they produce estrogens from an androgen predecessor which the ovaries release. The Leydig cells are the most important interstitial cells of the testis. They comprise 10-20% of the organ mass of the testis. The most important function of the Leydig cells is testosterone synthesis. Sertoli cells protect and nourish the sperms. In the embryonic development the Sertoli cells form the Anti-Mullerian hormone (AMH) which is responsible for inhibiting the development of the bipotent Mullerian ducts.

as gene expression. Sex-related hormones are not male or female substances. Rather, they refer to the specific effect or regulative function these messenger substances have on the cells of the target organs (Berliner et al. 1996).

Neither are genetical factors monocausal or one-dimensional. Anyone who wants to continue to argue with genetics today should among other things not forget epigenetics – one of the key issues of genetics in the 21st century. Epigenetics defines mechanisms and consequences of hereditary modifications of gene activity. Hereditary modifications of gene activity as a term is important – they are precisely not chromosome modifications. These can be environmental but also social-ecological adaptations. Epigenetics is not based on changes of the DNA sequence (deoxyribonucleic acid, DNA) or DNA replication. Rather, it involves subsequent modifications of specific DNA elements such as DNA bases (DNA methylization), changes of the chromatin (histo-modifications) and RNAi-mediated mechanisms. RNAi (RNA interference) is a mechanism in the cells of living organisms which serves the targeted deactivation of genes. For the sake of simplification one often talks of epigenetic markers that structure the chromosomes. They regulate gene activity on the level of cells and tissue and play an essential role in regulating development processes in plants, animals and humans. The processes are however potentially reversible and therefore in the course of a life subject to environmental and developmental variability. Epigenetic adaptations are not permanent, in contrast to mutations (Morgan et al. 2005).

Finally, I would like to point to the molecular-genetical and endocrinological research by Holterhus on the cell level. He conducts research on (sex-related) hormonal signature which can reflect biological sex features perhaps more accurately than chromosomale DNA alone. The function of a gene or a gene family is involved in the cellular process. Holterhus assumes that androgens not only have permanent effects during sensitive phases of our genital development, but also permanently on organs. It is becoming increasingly clear that the brain can also display a sex-related development which shows itself in relation to the bonding or absence of testosterone. This influences behaviour and can also modulate identity. According to Holterhus (2009) these processes not only concern the brain but all organs. It is assumed that already on the cellular level there are different signatures, e.g. four sex-related signatures. This can be an indication that in some people, independently of the androgen reception for the development of a male external appearance, a brain cell and transmitter-related sex/gender identity and specific metabolism can manifest itself, and also that other people can display a brain cell and transmitter-related

sex/gender identity and cellular inter sex/gender-related constitutiveness, only partly dependent on chromosomes, gonads and external sex-related features. In addition it could support the assumption that inter sex/gender-related constitutiveness is already present on the cellular level and is subject to its specific realities and norms.

## Conclusion

In the wiring boards of sex/gender there seem to be intrasystemically different levels of organization which in turn are subject to their own subdynamics. Subdynamics are not directly hierarchical by nature or deducible from each other. Rather, the organizational structure seems to be partly target-oriented and partly, via cellular portal systems, permeable in a complex way. Interactive interplays exist on all levels, both with the surrounding as well as with regard to ecological factors. Sex/gender-related constitutiveness can therefore neither be regarded as radically independent from nor radically dependent on biological, in particular hormonal factors. Rather, the multidimensional character of sex/gender-related constitutiveness should be emphasized and examined. This also means: alternating permutation and multifaceted play.

All humans are physically polyvalent; some are just more polyvalent than the average.

## References

***Avise, J. C., Nicholson, T.*** (Illustrator) (2011): Hermaphroditism: A Primer on the Biology, Ecology, and Evolution of Dual Sexuality. New York: Columbia University Press.

***Bailey, N. W., Zuk, M.*** (2009): Same-sex sexual behavior and evolution. In: Trends in Ecology & Evolution 24, 8, pp. 439-446.

***Berliner, D. L.*** et al. (1996): The functionality of the human vomeronasal organ (VNO): evidence for steroid receptors. In: J Steroid Biochem Mol Biol 58, S. 259-265. In: Proc. R. Soc. B (2010). doi: 10.1098/rspb.2009.1925. URL: http://rspb.royalsocietypublishing.org/content/277/1684/1049.full.pdf+html [10.06.2013].

***Brinkmann, L.*** et al. (2007): Behandlungserfahrungen von Menschen mit Intersexualität – Ergebnisse der Hamburger Intersex-Studie. In: Gynäkologische Endokrinologie 5, 4, pp. 235-242.

***Bundesverband Intersexuelle Menschen e.V.*** (2008): Schattenbericht zum 6. Staatenbericht der Bundesrepublik Deutschland zum Übereinkommen der Vereinten Nationen zur Beseitigung jeder Form der Diskriminierung der Frau (CEDAW), S. 13-20. URL: http://www.intersexuelle-menschen.net/parallelberichte/cedaw_2008.php [10.06.2013].

***Charlesworth, B.*** (1996): The evolution of sex chromosomes. In: Science 251, 4997, pp. 1030-1033.

***Crews, D.*** (2003): Sex determination: where environment and genetics meet. In: Evolution & Development 5, pp. 50-55.

***Cuozzo, K., Bratman, S.*** (2005): Women, Men, and Medicine: We're Not Equal. EBSCO Publishing.

***Deutscher Ethikrat*** (2012): Zur Situation von Menschen mit Intersexualität in Deutschland. Öffentliche Anhörung und Dialog. S. 28-47. URL: http://www.ethikrat.org/veranstaltungen/anhoerungen/intersexualitaet [10.06.2013].

***Dietrich, M. R.*** (2003): Richard Goldschmidt: Hopeful Monsters and Other 'Heresies'. In: Nature Reviews Genetics 4, pp. 68-74. URL: http://www.dartmouth.edu/~dietrich/NRG2003.pdf [10.06.2013].

***Duffy, T. A.*** et al. (2010): Ontogenesis of gonadal aromatase gene expression in atlantic silverside (Menidia menidia) populations with genetic and temperature-dependent sex determination. In: J Exp Zool A Ecol Genet Physiol 313, 7, pp. 421-431.

***Fausto-Sterling, A.*** et al. (2000): How sexually dimorphic are we? Review and synthesis. In: American Journal of Human Biology 12, pp. 151-166.

***Ghosh, D.*** et al. (2009): Structural basis for androgen specificity and oestrogen synthesis in human aromatase. In: Nature 457, 7226, S. 219-223. doi: 10.1038/nature07614.

***Goode, H.H., Machol, R. E.*** (1957): System Engineering: An Introduction to the Design of Large-scale Systems. New York: McGraw-Hill.

***Güitrón, A.*** et al. (1998): True hermaphroditism with bilateral ovotestis. Departamento de Ginecología. Hospital de Gineco Obstetricia Dr. Morones, IMSS, NL. In: Ginecol Obstet Mex. Jan, 66, pp. 21-23.

***Güntürkün, O., Hausmann, M.*** (2007): Funktionelle Hirnorganisation und Geschlecht. In: Gehirn und Geschlecht: Neurowissenschaft des kleinen Unterschieds zwischen Mann und Frau, Lautenbacher/Güntürkün/Hausmann (Eds.). Heidelberg: Springer, pp. 87-104.

***Guerra, G. Jr.*** et al. (1998): True Hermaphrodites in the Southeastern Region of Brazil: A Different Cytogenetic and Gonadal Profile. In: Journal of Pediatric Endocrinology and Metabolism. Metabolism 11, 4, pp. 519-524.

***Haldane, J. B. S.*** (1928): Possible Worlds and Other Essays. Harper and Brothers. 1937 edition London: Chatto & Windus. 2001 edition Transaction Publishers.

***Heigl-Ever, A., Weidenhammer, B.*** (1988): Der Körper als Bedeutungslandschaft. Die unbewusste Organisation der weiblichen Geschlechtsidentität. Bern: Hans Huber.

***Holterhus, P. M.*** et al. (2009): Disorders of sex development expose transcriptional autonomy of genetic sex and androgen-programmed hormonal sex in human blood leukocytes. In: BMC Genomics 10, S. 292. doi: 10.1186/1471-2164-10-292.

***Hughes, I. A. et al.*** (2006): Consensus statement on management of intersex disorders. In: Archives of disease in childhood 91, 7, pp. 554-563.

***Jacob, J., Mather, F. B.*** (2000): Sex reversal in chickens. FACTSHEET PS-53. Departement of Animal Sciences, University of Florida. URL: http://www2.ca.uky.edu/smallflocks/Factsheets/Sex_reversal_in_chickens.pdf [10.06.2013].

***Konrad, K., Firk, C., Uhlhaas, P. J.*** (2013): Brain Development During Adolescence: Neuroscientific Insights Into This Developmental Period. In: Deutsches Ärzteblatt International (Dtsch Arztebl Int) 110, 25, pp. 425-431. doi: 10.3238/arzte bl.2013.0425.

***Kuiper, H. J.*** (2001): Zytogenetische Untersuchungen an verschiedenen Haustierspecies. Inaugural-Dissertation. Tierärztliche Hochschule Hannover.

***Laqueur, T.*** (1990): Making Sex: Body and Gender from the Greeks to Freud. Cambridge Massachusetts: Harvard University Press. In deutscher Sprache (1992): Auf den Leib geschrieben. Die Inszenierung der Geschlechter von der Antike bis Freud. Frankfurt a.M./New York: Campus.

***Lehmann-Kannt, S.*** (2013): Komplette Androgenresistenz (CAIS) mit Persistenz von Müllerstrukturen und Menses. Vortrag auf dem 8. Berliner Symposium für Kinder- und Jugendgynäkologie. URL: http://www.kindergynaekologie.de/pdf/8_berlin_symp_2013.pdf [10.06.2013].

***Lévi-Strauss, C.*** (2013): Nous sommes tous des cannibales. Paris: Editions Seuil.

***Machol, R. E.*** (1957): System Engineering: An Introduction to the Design of Large-scale Systems. McGraw-Hill.

***Manolakou, P., Lavranos, G., Angelopoulou, R.*** (2006): Molecular patterns of sex determination in the animal kingdom: a comparative study of the biology of reproduction. In: Reproductive Biology and Endocrinology 4, 59. doi: 10.1186/1477-7827-4-59.

***Money, J.*** (1955): Hermaphroditism, Gender and precocity. Hyperandrenocorticism: Psychological Findings. In: Bulletin John Hopkins Hospital 96, pp. 253-264.

***Morgan, H. D.*** et al. (2005): Epigenetic reprogramming in mammals. In: Human molecular genetics. In: Hum Mol Genet. 14, 1, pp. 47-58.

***Ohno, S.*** (1967): Sex chromosomes and sex-linked genes. Berlin/Heidelberg/New York: Springer.

***Ohno, S.*** (1969): Evolution of Sex Chromosomes. In: Mammals. Annual Review of Genetics. Genetics 3, pp. 495-524.

***Pannetier, M.*** et al. (2006): FOXL2 activates P450 aromatase gene transcription: towards a better characterization of the early steps of mammalian ovarian development. Biologie du Développement et de la Reproduction. In: Journal of Molecular Endocrinology 36, pp. 399-413.

***Prior, H. M., Walter, M. A.*** (1996): SOX genes: architects of development. Ocular Genetics Research Group, University of Alberta, Edmonton, Alberta, Canada. In: Molecular Medicine 2, 4, pp. 405-412.

***Ragland-Sullivan, E.*** (2004): The Logic of Sexuation: From Aristotle to Lacan. Albany, New York: State University of New York Press.

***Ramo, S., St.Clair, R. K.*** (1998): The Systems Approach: Fresh Solutions to Complex Problems Through Combining Science and Practical Common Sense, Anaheim, California: KNI.

***Reinboth, R.*** (1975): Intersexuality in the animal kingdom. Symposium on Intersexuality in the Animal Kingdom in July 1974. Berlin/Heidelberg/New York: Springer.

***Schmitz, S.*** (2009): Gender und Diversity treffen auf Naturwissenschaften und Technik. In: Andresen/Koreuber/Lüdke (Eds.): Gender und Diversity: Albtraum oder Traumpaar? Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 175-190.

***Schützmann, K.*** et al. (2009): Psychological distress, self-harming behavior, and suicidal tendencies in adults with disorders of sex development. In: Archives of sexual behavior 38, 1, pp. 16-33.

***Schweizer, K., Richter-Appelt, H.*** (2009): Leben mit Intersexualität. Behandlungserfahrungen, Geschlechtsidentität und Lebensqualität. In: Psychotherapie im Dialog 10, 1, pp. 19-24.

***Schweizer, K., Richter-Appelt, H.*** (Eds.) (2012): Intersexualität kontrovers: Fakten, Erfahrungen, Positionen, Gießen: Psychosozial.

***The Telegraph*** (2008): The sex-change cockerel that once laid eggs. URL: http://www.telegraph.co.uk/news/newstopics/howaboutthat/3246272/The-sex-change-cockerel-that-once-laid-eggs.html [10.06.2013].

***Uhlenhaut, N. H.*** et al. (2009): Somatic sex reprogramming of adult ovaries to testes by FOXL2 ablation. Developmental Biology Unit. In: European Molecular Biology Laboratory 139, 6, pp. 1130-1142. doi: 10.1016/j.cell.2009.11.021.

***University of Babylon,*** Iraq. College of Medicine (2011): URL: http://www.uobabylon.edu.iq/uobcoleges/fileshare/articles/201142142_3_939.pdf [10.06.2013].

***Veyrunes, F.*** et al. (2010): A novel sex determination system in a close relative of the house mouse. In: Proc. R. Soc. B 277, pp. 1049-1056.

***Watson, J. M., Riggs, A., Graves, J. A.*** (1992): Gene mapping studies confirm the homology between the platypus X and echidna X1 chromosomes and identify a conserved ancestral monotreme X chromosome. In: Chromosoma 101, 10, pp. 596-601.