New Pictures in the DevTox Database

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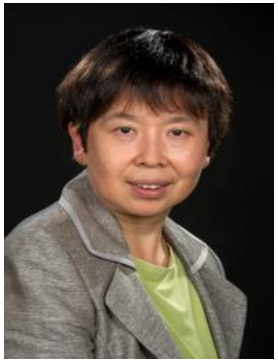
- Background Introduction
- The book *"Atlas of common malformations in Laboratory Rabbit and Rat"*
- New images uploaded to the DevTox database in 2019

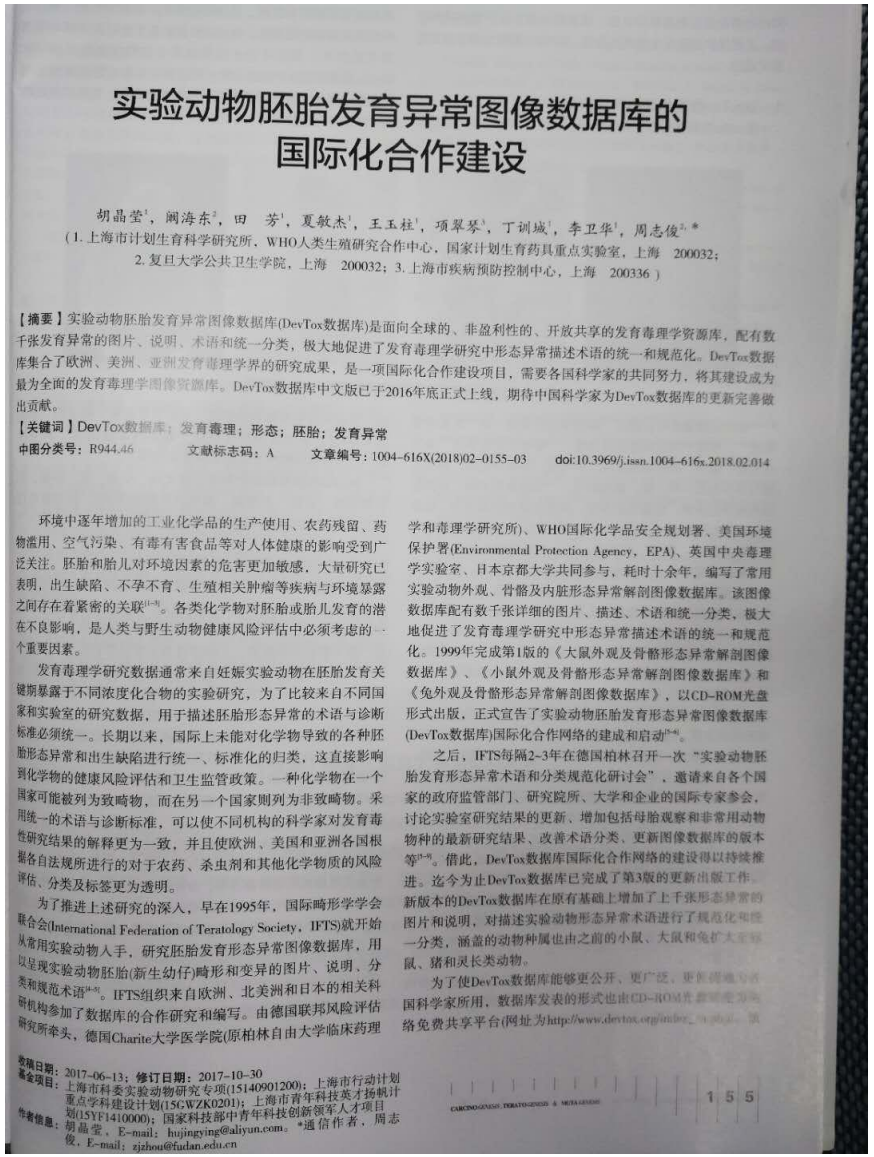
1. Background Introduction

DevTox Workshops in Shanghai, China, 2016

Roland Solecki, BfR
Ibrahim Chahoud, Charite
Rupert Kellner, Fraunhofer ITEM



Dr Wenna XU, BfR



实验动物胚胎发育异常图像数据库的国际化合作建设

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【摘要】实验动物胚胎发育异常图像数据库(DevTox数据库)是面向全球的、非盈利性的、开放共享的发育毒理学资源库，配有数千张发育异常的图片、说明、术语和统一分类，极大地促进了发育毒理学研究中形态异常描述术语的统一和规范化。DevTox数据库集合了欧洲、美洲、亚洲发育毒理学界的研究成果，是一项国际化合作建设项目，需要各国科学家的共同努力，将其建设成为最为全面的发育毒理学图像资源库。DevTox数据库中文版已于2016年底正式上线，期待中国科学家为DevTox数据库的更新完善做出贡献。

【关键词】DevTox数据库；发育毒理；形态；胚胎；发育异常
中图分类号：R944.46　　文献标志码：A　　文章编号：1004-616X(2018)02-0155-03　　doi:10.3969/j.issn.1004-616x.2018.02.014

环境中逐年增加的工业化学品的生产使用、农药残留、药物滥用、空气污染、有毒有害食品等对人体健康的影响受到广泛关注。胚胎和胎儿对环境因素的危害更加敏感，大量研究已表明，出生缺陷、不孕不育、生殖相关肿瘤等疾病与环境暴露之间存在着紧密的关联[1-3]。各类化学物对胚胎或胎儿发育的潜在不良影响，是人类与野生动物健康风险评估中必须考虑的一个重要因素。

发育毒理学研究数据通常来自妊娠实验动物在胚胎发育关键期暴露于不同浓度化合物的实验研究，为了比较来自不同国家和实验室的研究数据，用于描述胚胎形态异常的术语与诊断标准必须统一。长期以来，国际上未能对化学物导致的各种胚胎形态异常和出生缺陷进行统一、标准化的归类，这直接影响到化学物的健康风险评估和卫生监管政策。一种化学物在一个国家可能被列为致畸物，而在另一个国家则列为非致畸物。采用统一的术语与诊断标准，可以使不同机构的科学家对发育毒性研究结果的解释更为一致，并且使欧洲、美国和亚洲各国根据各自法规所进行的对于农药、杀虫剂和其他化学物质的风险评估、分类及标签更为透明。

为了推进上述研究的深入，早在1995年，国际畸形学学会联合会(International Federation of Teratology Society，IFTS)就开始从常用实验动物入手，研究胚胎发育形态异常图像数据库，用以呈现实验动物胚胎(新生幼仔)畸形和变异的图片、说明、分类和规范术语[4-5]。IFTS组织来自欧洲、北美洲和日本的相关科研机构参加了数据库的合作研究和编写。由德国联邦风险评估研究所牵头，德国Charite大学医学院(原柏林自由大学临床药理学和毒理学研究所)、WHO国际化学品安全规划署、美国环境保护署(Environmental Protection Agency，EPA)、英国中央毒理学实验室、日本京都大学共同参与，耗时十余年，编写了常用实验动物外观、骨骼及内脏形态异常解剖图像数据库。该图像数据库配有数千张详细的图片、描述、术语和统一分类，极大地促进了发育毒理学研究中形态异常描述术语的统一和规范化。1999年完成第1版的《大鼠外观及骨骼形态异常解剖图像数据库》、《小鼠外观及骨骼形态异常解剖图像数据库》和《兔外观及骨骼形态异常解剖图像数据库》，以CD-ROM光盘形式出版，正式宣告了实验动物胚胎发育形态异常图像数据库(DevTox数据库)国际化合作网络的建成和启动[6-8]。

之后，IFTS每隔2~3年在德国柏林召开一次“实验动物胚胎发育形态异常术语和分类规范化研讨会”，邀请来自各个国家的政府监管部门、研究院所、大学和企业的国际专家参会，讨论实验室研究结果的更新、增加包括母胎观察和非常用动物物种的最新研究结果、改善术语分类、更新图像数据库的版本等[9-10]。借此，DevTox数据库国际化合作网络的建设得以持续推进。迄今为止DevTox数据库已完成了第3版的更新出版工作。新版本的DevTox数据库在原有基础上增加了上千张形态异常的图片和说明，对描述实验动物形态异常术语进行了规范化和统一分类，涵盖的动物种属也由之前的小鼠、大鼠和兔扩大至豚鼠、猪和灵长类动物。

为了使DevTox数据库能够更公开、更广泛、更便捷地为各国科学家所用，数据库发表的形式也由CD-ROM光盘转变为网络免费共享平台(网址为http://www.devtox.org/index.php)。第

收稿日期：2017-06-13；修订日期：2017-10-30
基金项目：上海市科委实验动物研究专项(15140901200)；上海市行动计划重点学科建设计划(15GWZK0201)；上海市青年科技英才扬帆计划(15YF1410000)；国家科技部中青年科技创新领军人才项目(2016YFC1000500)
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DevTox introduction article was published in *“Chinese Journal of Carcinogenesis, Teratogenesis, Mutagenesis”, 2016*

- With close collaboration between DevTox and SIPPR, the Chinese version of the DevTox Database was launched on the website in the end of 2016.

Home | Index | Locations | Findings | Manuscript | Comments | DevTox | Ra | Mo | Rb | Ha | Pr | Gp | Mp | Do | Bi

Head / Neck – Exencephaly — **External finding** M

Synonym(s): –
Non-preferred term(s): Acrania

Definition:
Brain protrudes outside the skull due to absence of all or part of the cranial vault

Notes:
Erosion of brain

Fig. 12:
Additional finding: Open eye, macroglossia

主页 | 解剖学定位 | 结果 | 文本 | 评论 | DevTox | Ra | Mo | Rb | Ha | Pr | Gp | Mp | Do | Bi

头/颈 – 露脑畸形
Head / Neck – Exencephaly

外观结果 M

同义词: –
非首选术语: 无颅

定义:
由于颅骨全部或部分缺失，脑突出到颅骨外

注释:
不像无脑畸形那样发生脑组织侵蚀

图片 12:
其他发现: 张眼，巨舌

图片 13:
其他发现: 全身水肿，短口鼻，张眼(左)

图片 14: –

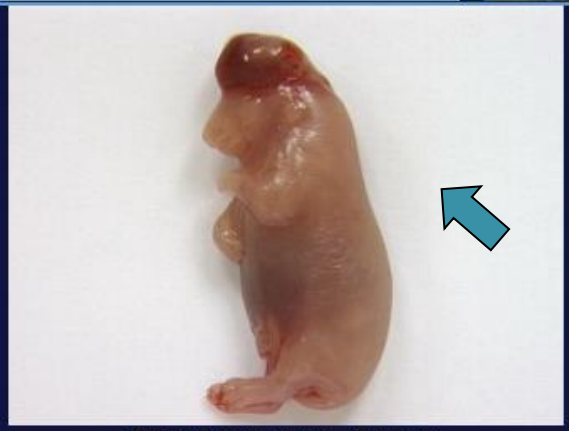
图片 15: –

Control

The Chinese version of the DevTox was available on website in 2016.

对照

大鼠，:对照图片



图片 14:大鼠，头/颈 – 露脑畸形.

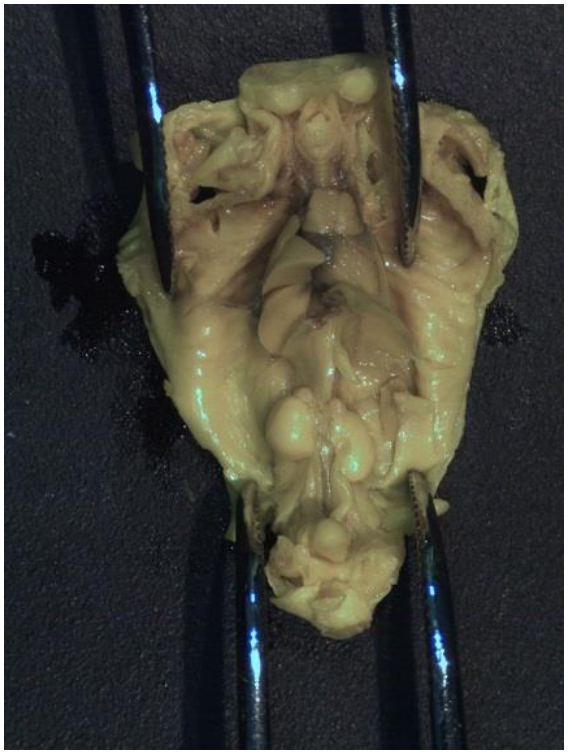
Chinese version of DevTox

- With technical support of BfR, Fraunhofer Institute for Toxicology and Experimental Medicine ITEM, CHARITÉ-Academical Medicine Berlin, in collaboration with Shanghai Institute of Planned Parenthood Research (SIPPR) and Fudan University.
- The purpose of launching Chinese version of DevTox is to introduce this valuable resource to Chinese health professionals and to promote the terminology harmonization of the developmental abnormalities.
- Call for Chinese researchers to share good images of developmental abnormalities with DevTox and international scientific community.

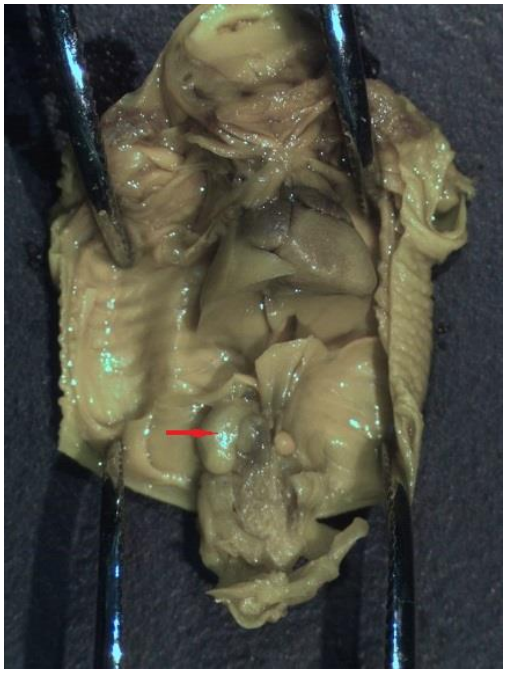
New pictures uploaded to DevTox in 2017

- Besides the translation of Chinese version DevTox, we also worked on teratogenic experiments and submitted new images to the DevTox Database.

- In 2017, twenty-five images of rat visceral anomalies and 20 images of mouse visceral anomalies were selected and uploaded to the Database.

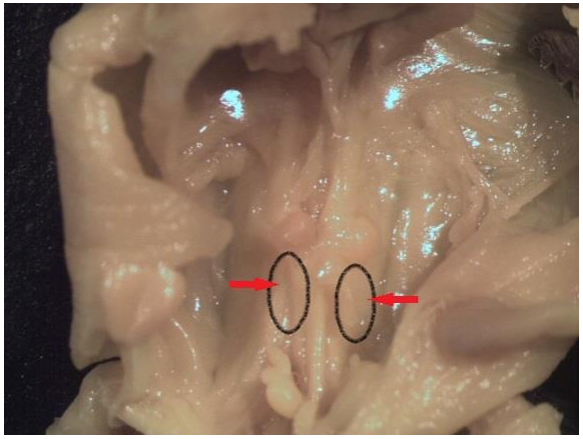


kidney control

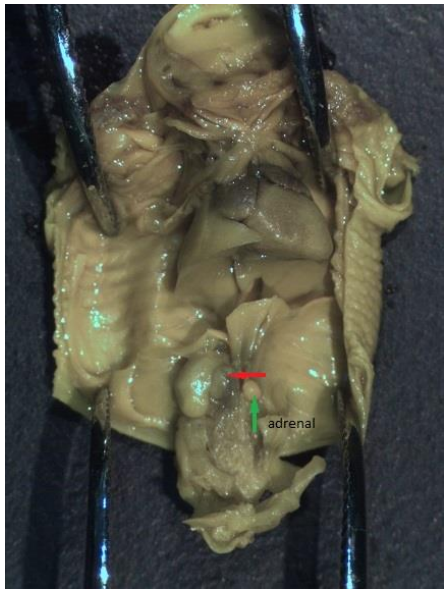


kidney large

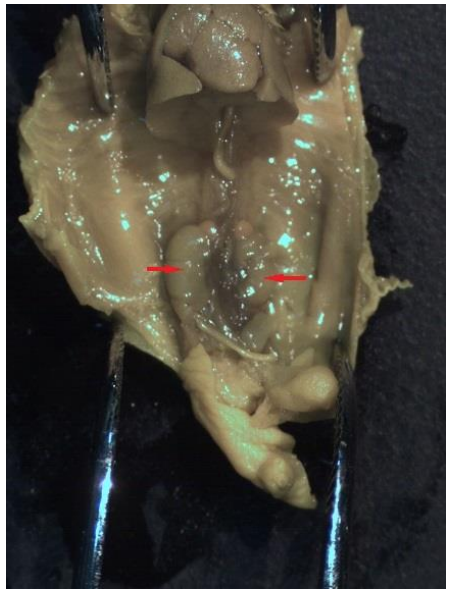
kidney small



kidney absent



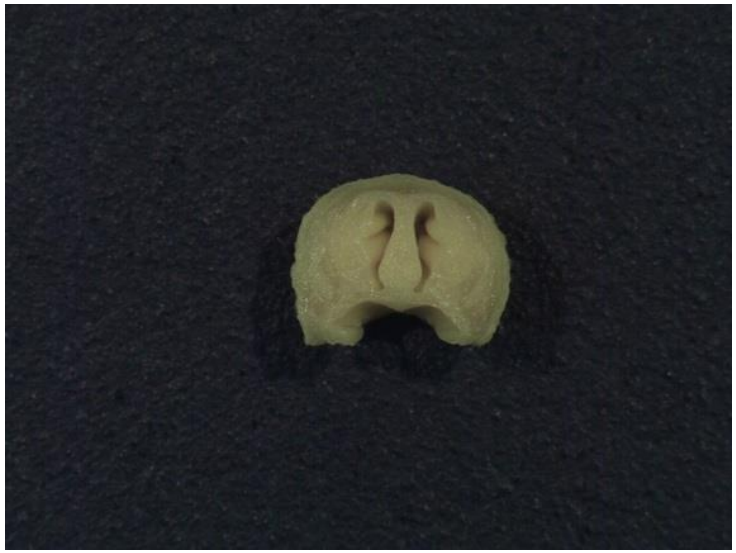
kidney malpositioned



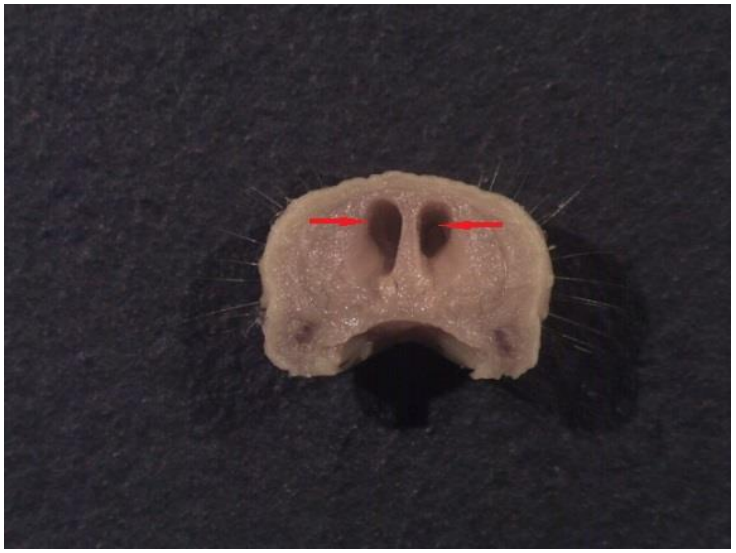
kidney misshapen

lens control

lens absent



nasal cavity control



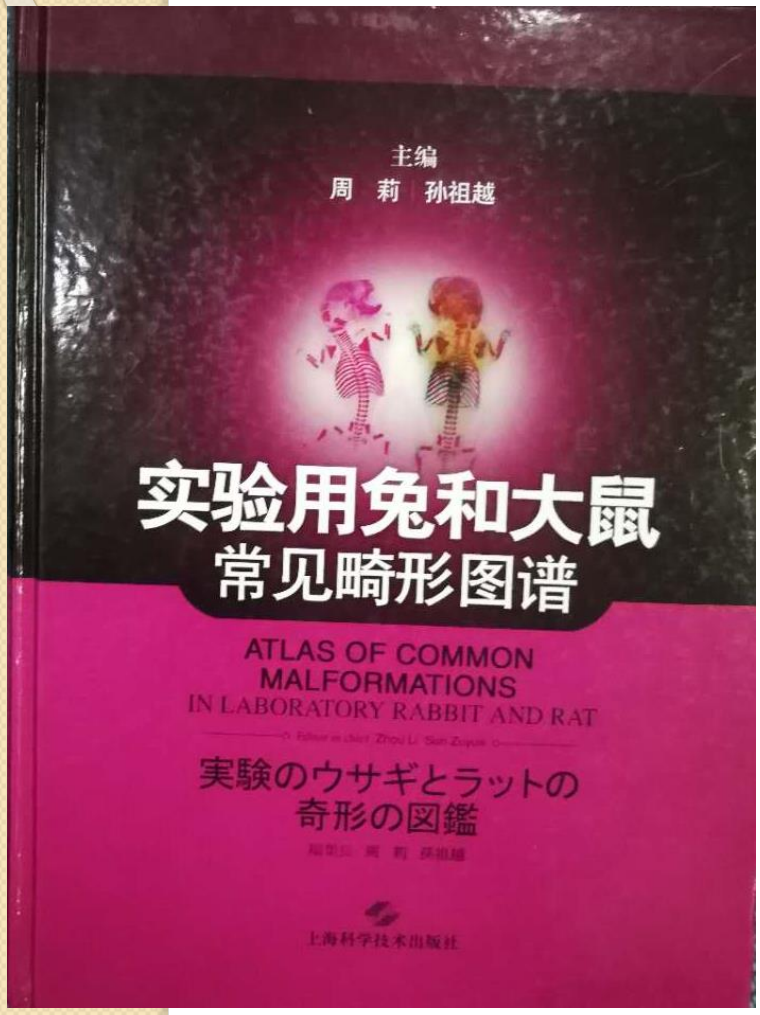
nasal cavity large
nasal conchae absent

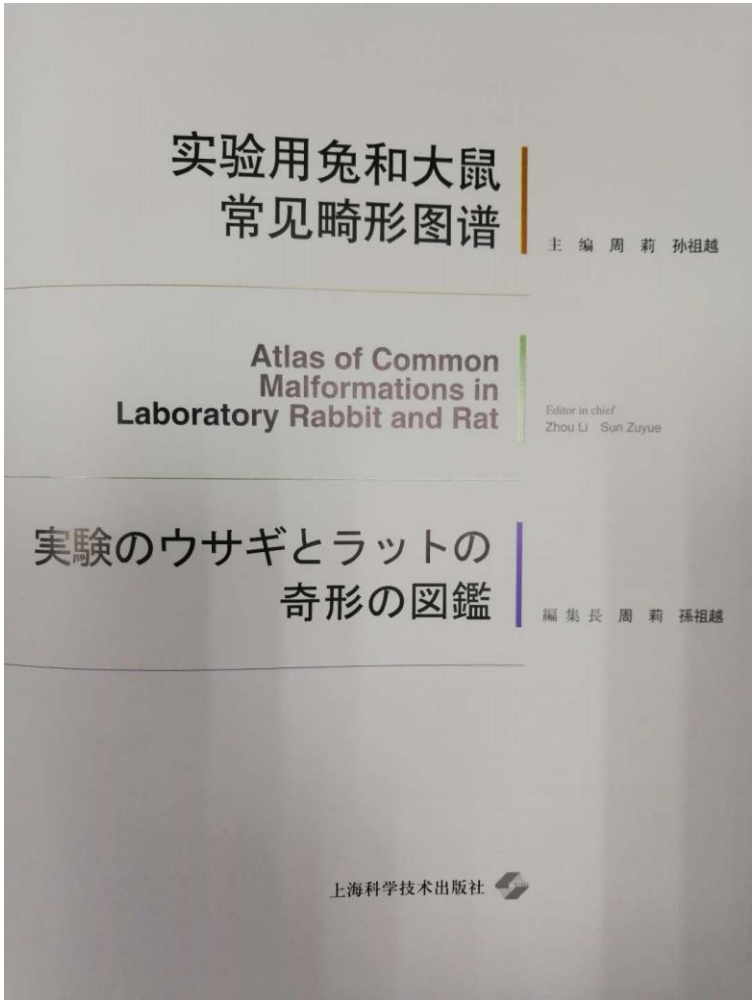
9th Berlin-Workshop on DevTox Terminology BfR, Berlin, 2018

Participated in 9th Berlin-Workshop on DevTox Terminology, Berlin, 2018.

Discussed about the possible collaboration on the incorporation of "Chinese Atlas of common malformations in Laboratory Rabbit and Rat" into DevTox database.

2. The book *"Atlas of common malformations in Laboratory Rabbit and Rat"*, SIPPR, China





- The book "*Atlas of Common Malformations in Laboratory Rabbit and Rat*" was published in China in 2015, which contained more than 500 original developmental abnormality images.

- Upon mutual agreement, the images in this book were shared with DevTox, and some pictures were uploaded to DevTox database in 2019.

Visit to Fraunhofer ITEM to discuss about the technical details of DevTox data base update in 2019

A close team work in BfR in 2019

New images uploaded to DevTox

A total of 160 new abnormality images were uploaded to DevTox data base in 2019.

External findings： 31 new images

Skeletal findings： 76 new images

Visceral findings： 52 new images

Why were these images chosen?

1. Images showing new anomalies which were not available in DevTox database

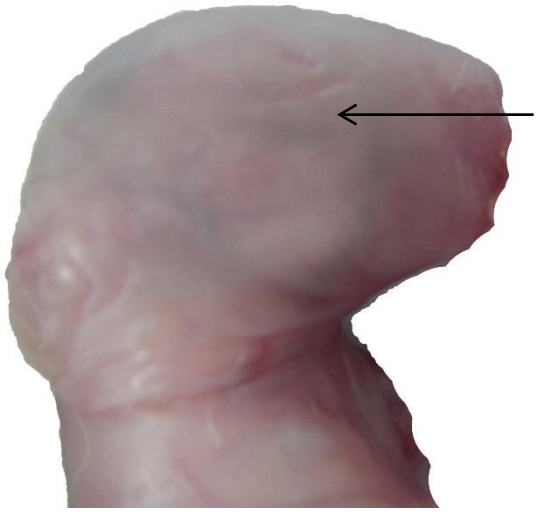
2. Some fresh tissue (before fixation) images for external findings were added

3. Each new image had a corresponding hand-draw sketch

4. Images were from rats and rabbits

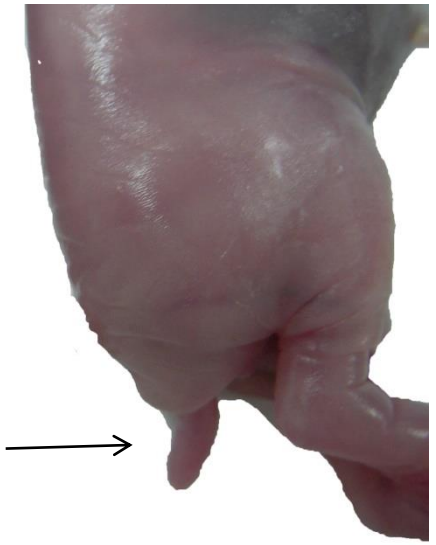
New external finding images (31 images)

Eye control (rabbit)



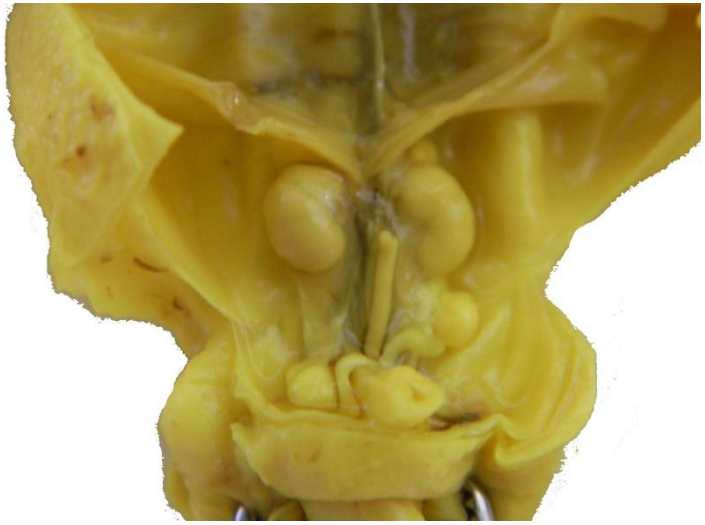
Eye – Cryptophthalmia（rabbit）

Tail control (rabbit)

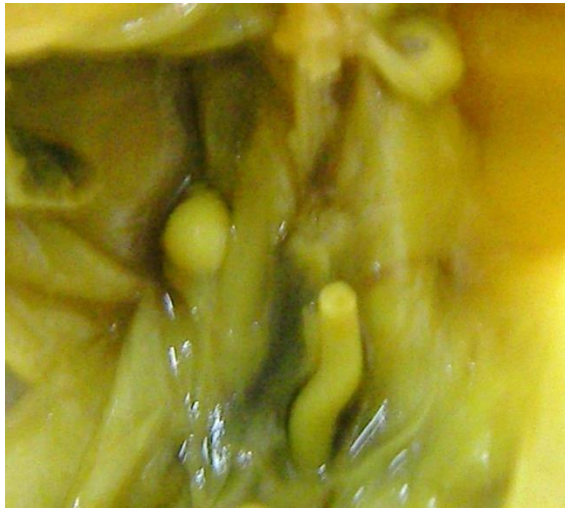


Tail – small (rabbit)

New visceral finding images (52 images)



Adrenal control (rat)

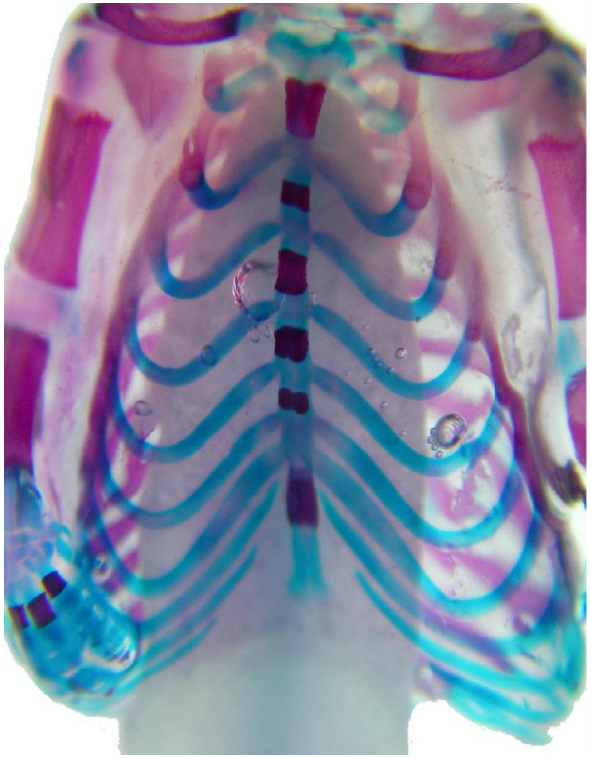


Adrenal absent (rat)

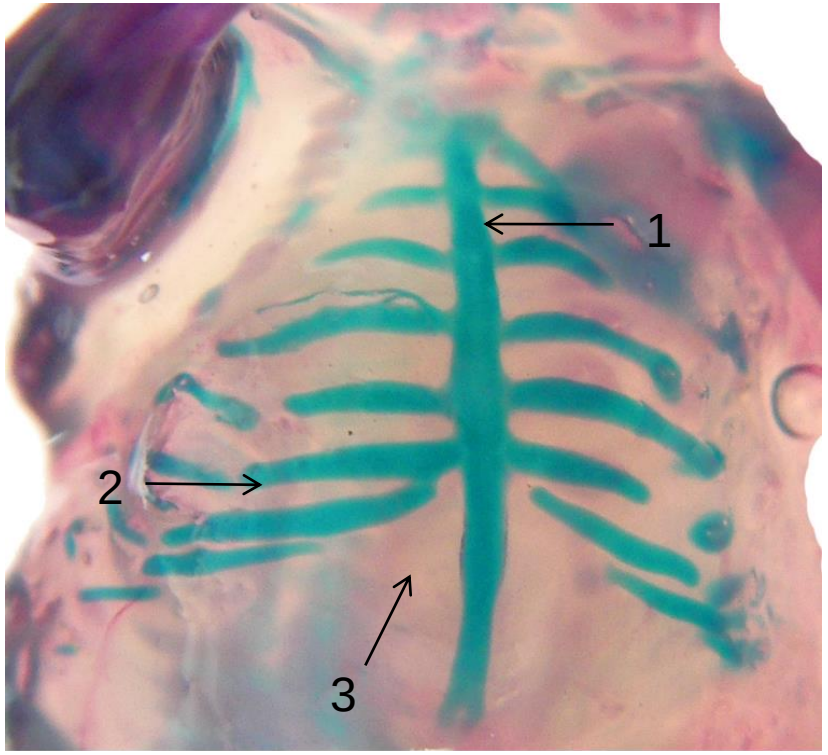
Brain control (rat)

Perimeningeal space - Red material (rat)

New skeletal finding images (76 images)

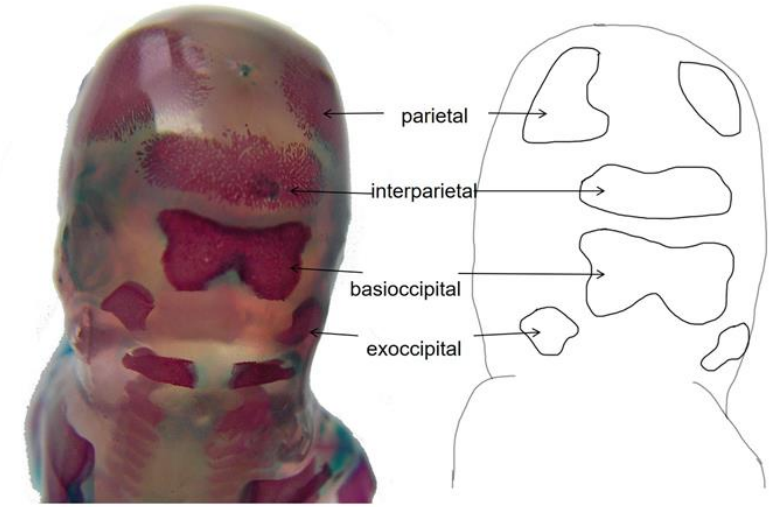


Rib control (rat)

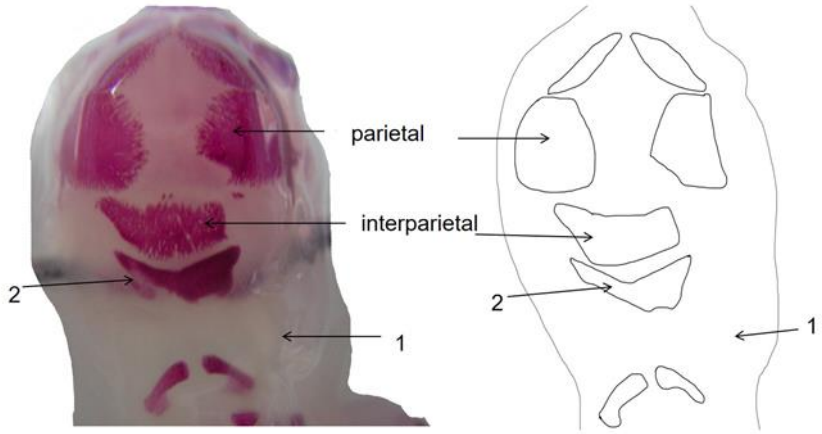


1. Sternebra-unossified ; 2. Costal cartilage - interrupted; 3. Costal cartilages fused (rat)

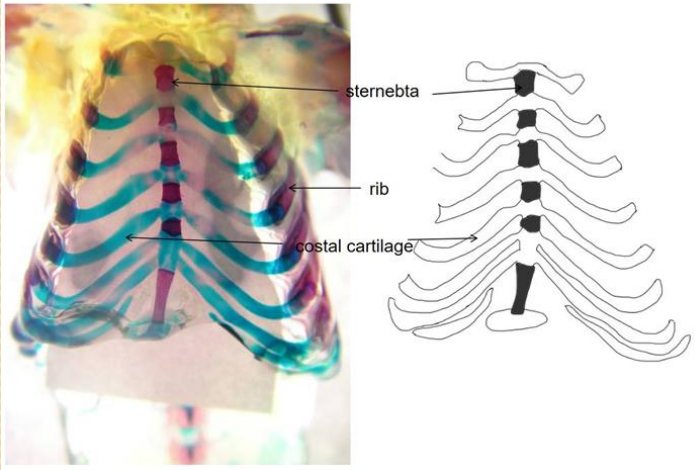
Images and corresponding hand draw sketch



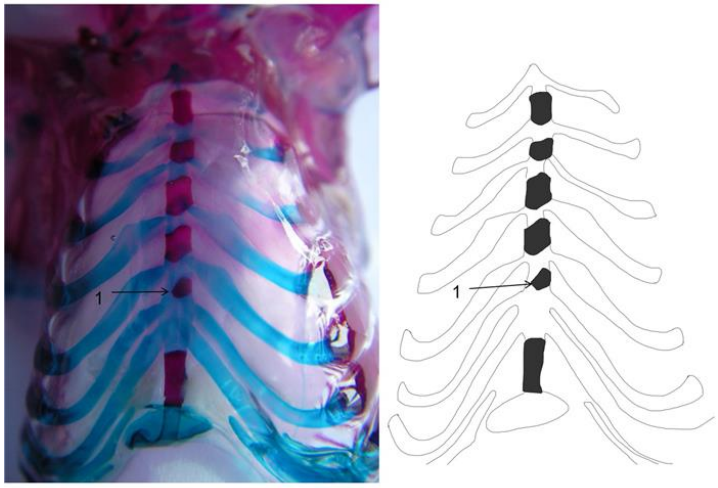
Skull control (rat)



1. Exoccipital – Absent;2. Basioccipital - Incomplete ossification (rat)



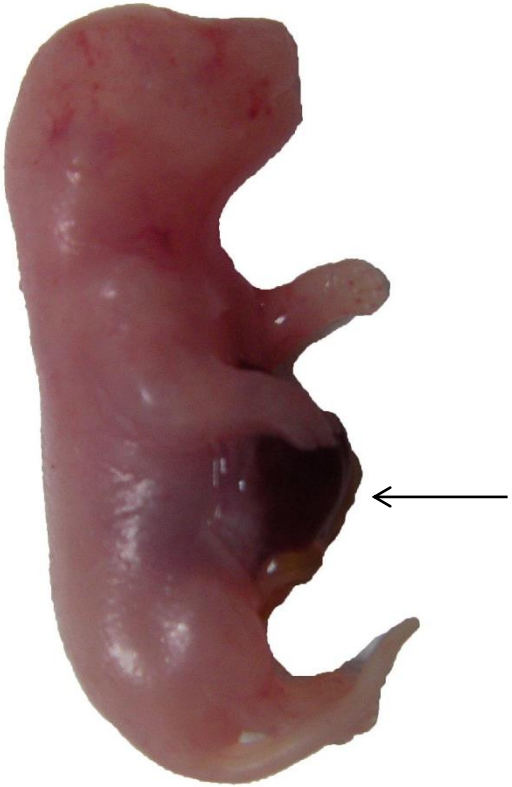
Rib control (rabbit)



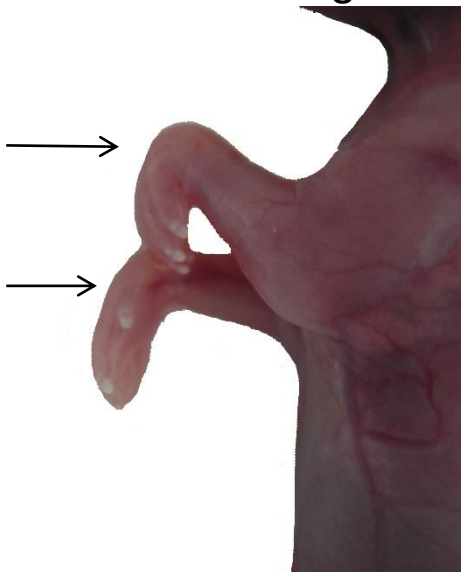
1. 5th sternebra hemisternabra (rabbit)

Fresh tissue images

Head / Neck - cranial meningocele (rabbit)



Trunk – Omphalocele (rat)



Limb (fore- or hind-) – hyperflexion (rabbit)

Contents

- Background Introduction
- A book *"Atlas of common malformations in Laboratory Rabbit and Rat"*
- New images uploaded to DevTox data base in 2019

In the future, more pictures will be chosen for upload. We look forward to collaborating with DevTox more closely, and sharing more pictures with all colleagues.

Thank You

BfR in Berlin
Fraunhofer ITEM in Hannover
CHARITÉ- Academical Medicine, Berlin
SIPPR & Fudan University in Shanghai