Do we get better and make things worse?

Managing a taxon in zoos on the individual and the population level, using the giraffe (*Giraffa camelopardalis*) as an example





Lara Scherer, Laurie Bingaman Lackey, Dennis W. H. Müller, Marco Roller, Mads F. Bertelsen, Max Hahn-Klimroth, Paul Dierkes, Marcus Clauss

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University of Zurich[UZH]

Clinic of Zoo Animals, Exotic Pets and Wildlife

How are animals in zoos doing ?

Compromised Survivorship in Zoo Elephants

Ros Clubb,[1] Marcus Rowcliffe,[2] Phyllis Lee,[3,4] Khyne U. Mar,[2,5] Cynthia Moss,[4] Georgia J. Mason[6]*

Wild animals can experience poor welfare when held captive (*1*), an effect with ethical and practical implications. In zoos, the welfare of African elephants (*Loxodonta africana*) and Asian elephants (*Elephas maximus*) has long caused concern. Infanticide, *Herpes*, tuberculosis, lameness, infertility, and stereotypic behavior are prevalent (*2*), and zoo elephant populations are not self-sustaining without importation (*3*). We compiled data from over 4500 individuals to compare survivorship in zoos with protected populations in range countries. Data representing about half the global zoo population (1960 to 2005) came from European "studbooks" and the European Elephant Group (*4*). We focused on females as relevant to population viability ($N = 786$, both wild-caught and captive-born; 302 African and 484 Asian). African elephants in Amboseli National Park, Kenya ($N = 1089$), and Asian elephants in the Burmese logging industry (Myanma Timber Enterprise, M.T.E., $N = 2905$, wild-caught and captive-born) acted as well-provisioned reference populations [for details, see (*2*) and (*5*)].

For African elephants, median life spans (excluding premature and still births) were 16.9 years [95% confidence interval (CI) 16.4 to unknown; upper estimate for median not reached] for zoo-born females and 56.0 years (95% CI 51.5 to unknown) for Amboseli females undergoing natural mortality (35.9 years with human-induced deaths, 95% CI 33.8 to 40.3). Neither infant nor juvenile mortality differed between populations (Fig. 1A and tables S1 and S2), but adult females died earlier in zoos than in Amboseli (Fig. 1B and table S2). Zoo adult African survivorship has improved in recent years [$z = -2.75$, $P < 0.01$ (*5*)], but mortality risks in our data set's final year (2005) remained 2.8 times higher (95% CI 1.2 to 6.5) than that of Amboseli females undergoing natural mortality.

For Asian elephants, median life spans (excluding premature and still births) for captive-born females were 18.9 years in zoos (95% CI 17.7 to 34.0) and 41.7 years in the M.T.E. population (95% CI 38.2 to 44.6). Zoo infant mortality rates were high (over double those of M.T.E.): A female's first pregnancy therefore had only a 42% chance of yielding a live year-old in zoos compared with 83% in M.T.E.

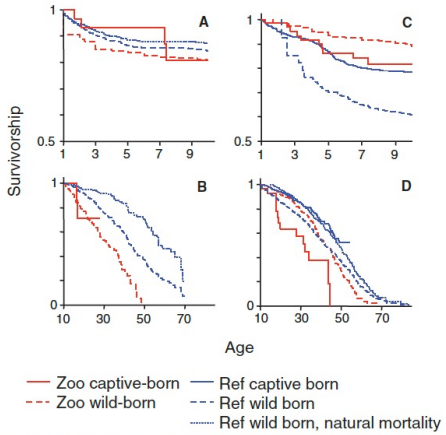

Fig. 1. Kaplan-Meier survivorship curves for female African (**A** and **B**) and Asian (**C** and **D**) elephants aged 1 to 10 [juveniles in (A) and (C)] and 10+ years [adults in (B) and (D)]. For wild-born reference (Ref, Amboseli or M.T.E.) populations, natural mortality excludes human-caused deaths; all mortality includes them (*5*). Results of statistical comparisons are given in table S2.

(table S1). Rates have not significantly improved over time (e.g., live births controlling for parity: $z = 1.19$, $P > 0.10$). For juveniles, captive-born survivorship did not significantly differ between populations, whereas wild-born survivorship was poorer in Burma (Fig. 1C and table S2) because of after-effects of capture (*5*). In adulthood, however, survivorship was lower in zoos (Fig. 1D and table S2), with no detectable improvement in recent years ($z = -1.48$, $P > 0.10$).

Within zoos, captive-born Asians have poorer adult survivorship than wild-born Asians (Fig. 1D and table S2). This is a true birth origin effect: Whereas zoo-born elephants are more likely to have been born recently and to primiparous dams, neither dam parity ($z = 0.86$, $P > 0.10$) nor recency ($z = -1.48$, $P > 0.10$) predict adult survivorship (controlling for recency makes birth origin more significant: $z = -3.52$, $P < 0.001$). Because the median importation age of wild-born females was about 3.4 years, this suggests that zoo-born Asians' elevated adult mortality risks are conferred during gestation or early infancy.

Interzoo transfers also reduced Asian survivorship (see supporting online text), an effect lasting 4 years posttransfer ($z = -2.10$, $P < 0.05$, controlling for birth origin). Additionally, survivorship tended to be poorer in Asian calves removed from mothers at young ages ($z = -1.92$, $P < 0.10$) (*5*).

Overall, bringing elephants into zoos profoundly impairs their viability. The effects of early experience, interzoo transfer, and possibly maternal loss, plus the health and reproductive problems recorded in zoo elephants [e.g., (*2*)], suggest stress and/or obesity as likely causes.

References and Notes

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5. Methods and supplementary results are available as supporting material on *Science* Online.
6. G.J.M. thanks the Natural Science and Engineering Research Council for funding; R.C. and G.J.M. thank R. Ripley for statistical advice; P.L. and C.M. thank many conservation nongovernmental organizations and private donors for supporting the Amboseli Elephant Trust; K.U.M. thanks colleagues at M.T.E. for data compilation and comments. G.J.M. is a visiting professor at The Royal Veterinary College, London, UK. K.U.M. has received funding from Prospect Burma Foundation, Charles Wallace Burma Trust, Three Oaks Foundation, Whitney-Laing Foundation (Rufford Small Grants), Toyota Foundation, Fantham Memorial Research Scholarship, and University College London. K.U.M. has been a paid consultant for Woburn Safari Park, UK. G.J.M. has been a paid consultant to Disney's Animal Kingdom, USA.

Supporting Online Material
www.sciencemag.org/cgi/content/full/322/5908/1649/DC1
Materials and Methods
SOM Text
Tables S1 and S2
References

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[1]Royal Society for the Prevention of Cruelty to Animals (RSPCA), Wilberforce Way, Southwater, West Sussex, RH13 9RS, UK. [2]Institute of Zoology, Zoological Society of London, London NW1 4RY, UK. [3]Psychology Department, University of Stirling, Stirling FK9 4LA, UK. [4]Amboseli Trust for Elephants, Post Office Box 15135, Nairobi, Kenya. [5]Department of Animal and Plant Sciences, University of Sheffield, Western Bank, Sheffield S10 2TN, UK. [6]Animal Sciences Department, University of Guelph, Guelph N1G 2W1, Canada.
*To whom correspondence should be addressed. E-mail: gmason@uoguelph.ca

Captive and Wild Orangutan (*Pongo* sp.) Survivorship: A Comparison and the Influence of Management

S.A. WICH[1]*, R.W. SHUMAKER[1], L. PERKINS[2], AND H. DE VRIES[3]
[1]*Great Ape Trust of Iowa, Des Moines, Iowa*
[2]*Zoo Atlanta, Atlanta, Georgia*
[3]*Research Group Behavioural Biology, Utrecht University, Utrecht, The Netherlands*

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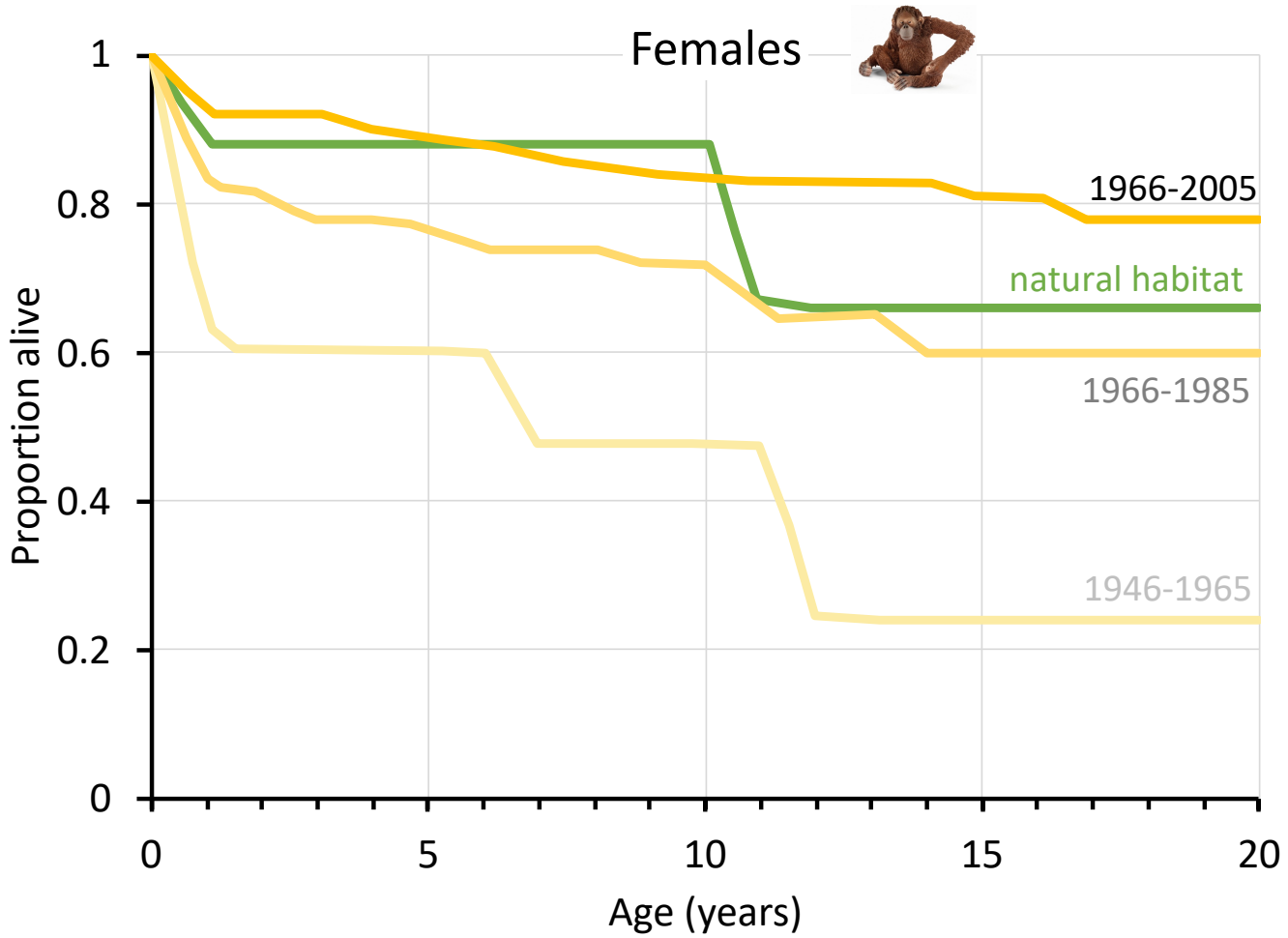

Zoos become better at keeping animals alive

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TECHNICAL REPORT

ZOOBIOLOGY WILEY

The historical development of juvenile mortality and adult longevity in zoo-kept carnivores

Marco Roller[1] | Dennis W. H. Müller[2] | Mads F. Bertelsen[3] | Laurie Bingaman Lackey[4] | Jean-Michel Hatt[5] | Marcus Clauss[5]

[1]Zoological Garden Karlsruhe, Karlsruhe, Germany
[2]Zoological Garden Halle (Saale), Halle (Saale), Germany
[3]Copenhagen Zoo, Frederiksberg, Denmark
[4]World Association of Zoos and Aquariums (WAZA), Barcelona, Spain
[5]Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland

Correspondence
Marcus Clauss, Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Winterthurerstr. 260, 8057 Zurich, Switzerland.
Email: mclauss@vetclinics.uzh.ch

Abstract
Zoos need to evaluate their aim of high husbandry standards. One way of approaching this is to use the demographic data that has been collected by participating zoos for decades, assessing historical change over time to identify the presence or absence of progress. Using the example of carnivores, with data covering seven decades (1950–2019), 13 carnivore families, and 95 species, we show that juvenile mortality has decreased, and adult longevity increased, over this interval. While no reason for complacency, the results indicate that the commitment of zoos to continuously improve is having measurable consequences.

KEYWORDS
Carnivora, husbandry, progress, survival, zoo

1 | INTRODUCTION

Zoos are institutions where humans interact with a large variety of species kept for display and species conservation. Over the centuries, the value of zoos has expanded to include recreational, educational, and scientific purposes. Their conservation aims focus on both ex situ programs in terms of conserving individual species as such (Conde et al., 2011), and in situ actions in terms of contributing to habitat (and hence, indirectly species) conservation (Gusset & Dick, 2011; Tribe & Booth, 2003). These activities are performed with an increasing focus on animal welfare (Hosey et al., 2013).

There are several narratives about the aim of animal welfare. They include "proximal cause narratives," arguing that it is only justified, or socially acceptable, to pursue the zoological institution's other aims if animal welfare is not compromised and is state-of-the-art (Gray, 2017). While this narrative is plausible and valid, it tends to overshadow the "ultimate cause narrative" that optimal animal welfare is an aim of zoological institutions for its own sake, because of the self-concept of zoo professionals, and their vision that it is possible to create an ideal environment, providing a meaningful yet anxiety-free life for individual animals that foregoes the many causes of fear and harm they are exposed to in natural habitats (Clauss & Schiffmann, 2021). Creating such conditions on a species-specific basis is a learning process, and zoos need to know if they are making progress.

In their dedication to professional animal husbandry, zoos have long instigated record-keeping systems that facilitate tracking individual animals and evaluating life stage-specific mortality (Carisch et al., 2017; Müller et al., 2011; Tidière et al., 2016; Young et al., 2012). This also allows assessing progress in husbandry practices: one would expect uncontrolled, life stage-specific mortality (e.g., neonatal mortality) to decrease over time, if husbandry standards have improved over the years, as has been demonstrated in individual species like okapi (*Okapia johnstoni*) (EAZWV Summer School Participants & Clauss, 2008), orangutans (*Pongo* sp.) (Wich et al., 2009) or chimpanzees (*Pan troglodytes*) (Havercamp et al., 2019).

Here, we test whether several metrics—neonate/juvenile mortality and the proportion of 1-year-old animals that reach 50% of the species' reported maximum longevity—changed in 95 zoo-kept

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[1]Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland
[2]Hendersonville, North Carolina, USA
[3]Zoological Garden Wuppertal, Wuppertal, Germany
[4]Indianapolis Zoo, Indianapolis, Indiana, USA
[5]Zoological Garden Halle (Saale), Halle (Saale), Germany
[6]Zoological Garden Karlsruhe, Karlsruhe, Germany
[7]Tier-Erlebnispark Bell, Bell, Germany
[8]European Elephant Service, Endocrinology Laboratory, German Primate Center, Goettingen, Germany

Correspondence
Marcus Clauss, Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Winterthurerstr 260, Zurich 8057, Switzerland.
Email: mclauss@vetclinics.uzh.ch

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KEYWORDS
husbandry, mortality, Proboscidea, progress, survival

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RESEARCH ARTICLE

ZOOBIOLOGY WILEY

Historical development of the survivorship of zoo rhinoceroses—A comparative historical analysis

Anita Wittwer[1] | Marco Roller[2] | Dennis W. H. Müller[3] | Mads F. Bertelsen[4] | Laurie Bingaman Lackey[5] | Beatrice Steck[6] | Rebecca Biddle[7] | Lars Versteege[8] | Marcus Clauss[1]

[1]Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland
[2]Zoological Garden Karlsruhe, Karlsruhe, Germany
[3]Zoological Garden Halle (Saale), Halle, Germany
[4]Copenhagen Zoo, Frederiksberg, Denmark
[5]1230 Oakland Street, Hendersonville, North Carolina, USA
[6]Zoological Garden of Basel, Basel, Switzerland
[7]Twycross Zoo—East Midland Zoological Society, Norton Grange, Warwickshire, UK
[8]Safaripark Beekse Bergen, Hilvarenbeek, The Netherlands

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Zoo animal husbandry is a skill that should be developing constantly. In theory, this should lead to an improvement of zoo animal survivorship over time. Additionally, it has been suggested that species that are at a comparatively higher risk of extinction in their natural habitats (in situ) might also be more difficult to keep under zoo conditions (ex situ). Here, we assessed these questions for three zoo-managed rhinoceros species with different extinction risk status allocated by the IUCN: the "critically endangered" black rhino (*Diceros bicornis*), the "vulnerable" greater one-horned (GOH) rhino (*Rhinoceros unicornis*), and the "near threatened" white rhino (*Ceratotherium simum*). Comparing zoo animals ≥1 year of age, the black rhino had the lowest and the white rhino the highest survivorship, in congruence with their extinction risk status. Historically, the survivorship of both black and white rhino in zoos improved significantly over time, whereas that of GOH rhino stagnated. Juvenile mortality was generally low and decreased even further in black and white rhinos over time. Together with the development of population pyramids, this shows increasing competence of the global zoo community to sustain all three species. Compared to the continuously expanding zoo population of GOH and white rhinos, the zoo-managed black rhino population has stagnated in numbers in recent years. Zoos do not only contribute to conservation by propagating ex situ populations, but also by increasing species-specific husbandry skills. We recommend detailed research to understand specific factors responsible for the stagnation but also the general improvement of survivorship of zoo-managed rhinos.

KEYWORDS
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Corresponden
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Pets and Wild
University of
8057 Zurich,
Email: mclauss

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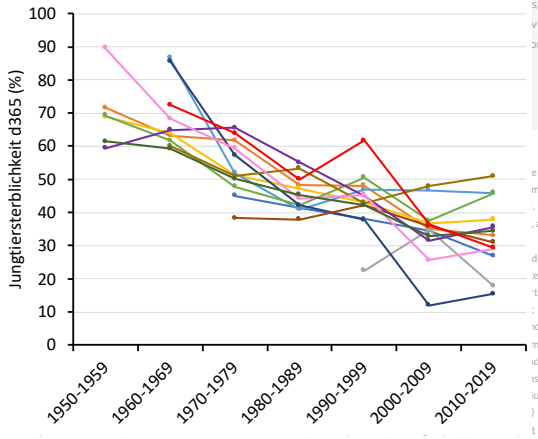

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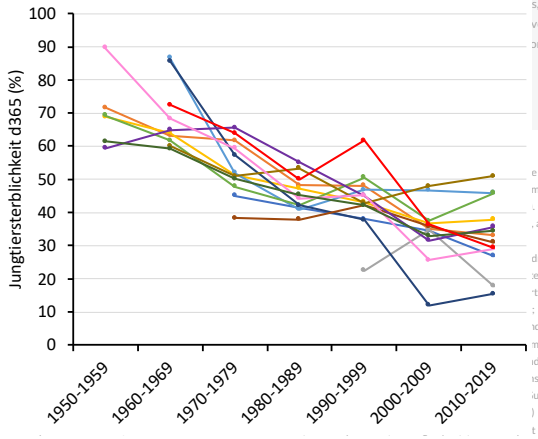

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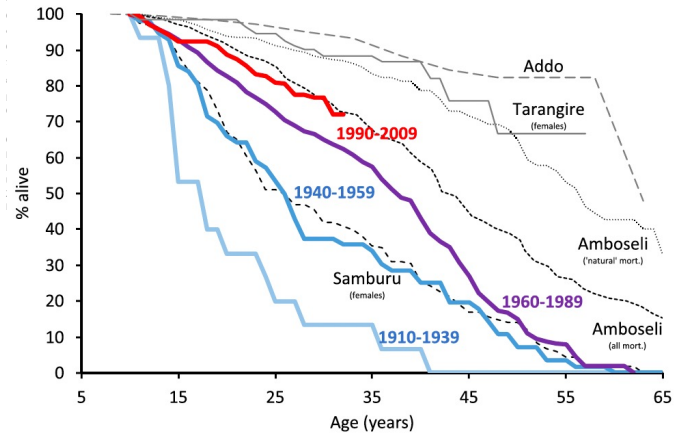

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RESEARCH ARTICLE

ZOOBIOLOGY WILEY

Historical development of the survivorship of zoo rhinoceroses—A comparative historical analysis

Anita Wittwer[1] | Marco Roller[2] | Dennis W. H. Müller[3] | Mads F. Bertelsen[4] | Laurie Bingaman Lackey[5] | Beatrice Steck[6] | Rebecca Biddle[7] | Lars Versteege[8] | Marcus Clauss[1]

[1]Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland
[2]Zoological Garden Karlsruhe, Karlsruhe, Germany
[3]Zoological Garden Halle (Saale), Halle, Germany
[4]Copenhagen Zoo, Frederiksberg, Denmark
[5]1230 Oakland Street, Hendersonville, North Carolina, USA
[6]Zoological Garden of Basel, Basel, Switzerland
[7]Twycross Zoo—East Midland Zoological Society, Norton Grange, Warwickshire, UK
[8]Safaripark Beekse Bergen, Hilvarenbeek, The Netherlands

Correspondence
Marcus Clauss, Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Winterthurerstr. 260, 8057 Zurich, Switzerland.
Email: mclauss@vetclinics.uzh.ch

Abstract

Zoo animal husbandry is a skill that should be developing constantly. In theory, this should lead to an improvement of zoo animal survivorship over time. Additionally, it has been suggested that species that are at a comparatively higher risk of extinction in their natural habitats (in situ) might also be more difficult to keep under zoo conditions (ex situ). Here, we assessed these questions for three zoo-managed rhinoceros species with different extinction risk status allocated by the IUCN: the "critically endangered" black rhino (*Diceros bicornis*), the "vulnerable" greater one-horned (GOH) rhino (*Rhinoceros unicornis*), and the "near threatened" white rhino (*Ceratotherium simum*). Comparing zoo animals ≥1 year of age, the black rhino had the lowest and the white rhino the highest survivorship, in congruence with their extinction risk status. Historically, the survivorship of both black and white rhino in zoos improved significantly over time, whereas that of GOH rhino stagnated. Juvenile mortality was generally low and decreased even further in black and white rhinos over time. Together with the development of population pyramids, this shows increasing competence of the global zoo community to sustain all three species. Compared to the continuously expanding zoo population of GOH and white rhinos, the zoo-managed black rhino population has stagnated in numbers in recent years. Zoos do not only contribute to conservation by propagating ex situ populations, but also by increasing species-specific husbandry skills. We recommend detailed research to understand specific factors responsible for the stagnation but also the general improvement of survivorship of zoo-managed rhinos.

KEYWORDS
husbandry, Perissodactyla, progress, survival, zoo

Zoos become better at keeping animals alive

Received: 1 February 2021 | Revised: 25 May 2021 | Accepted: 25 June 2021
DOI: 10.1002/zoo.21639

TECHNICAL REPORT

ZOOBIOLOGY WILEY

The historical development of juvenile mortality and adult longevity in zoo-kept carnivores

Marco Roller[1] | Dennis W. H. Müller[2] | Mads F. Bertelsen[3] | Laurie Bingaman Lackey[4] | Jean-Michel Hatt[5] | Marcus Clauss[5]

[1]Zoological Garden Karlsruhe, Karlsruhe, Germany
[2]Zoological Garden Halle (Saale), Halle (Saale), Germany
[3]Copenhagen Zoo, Frederiksberg, Denmark
[4]World Association of Zoos and Aquariums (WAZA), Barcelona, Spain
[5]Clinic for Zoo Wildlife, Vetsu Zurich, Zurich

Corresponden
Marcus Clauss Pets and Wild University of 8057 Zurich, Email: mclauss

Abstract

Zoos need to evaluate their aim of high husbandry standards. One way of approaching this is to use the demographic data that has been collected by participating zoos for decades, assessing historical change over time to identify the presence or absence of progress. Using the example of carnivores, with data cov-

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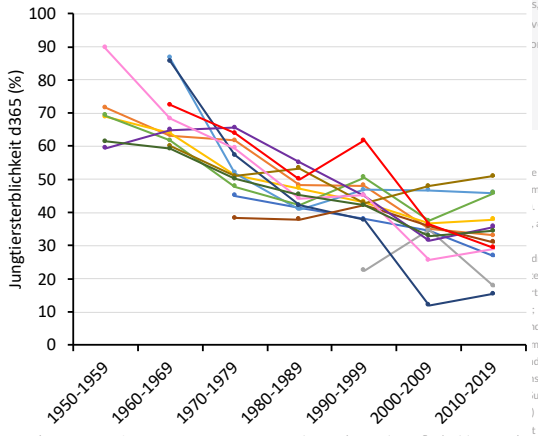

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; Young et al.,
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) (Wich et al.,
t al., 2019).

"ultimate cause narrative" that optimal animal welfare is an aim of zoological institutions for its own sake, because of the self-concept of zoo professionals, and their vision that it is possible to create an ideal

Here, we test whether several metrics—neonate/juvenile mortality and the proportion of 1-year-old animals that reach 50% of the species' reported maximum longevity—changed in 95 zoo-kept

Received: 31 May 2022 | Revised: 25 August 2022 | Accepted: 26 August 2022
DOI: 10.1002/zoo.21733

TECHNICAL REPORT

ZOOBIOLOGY WILEY

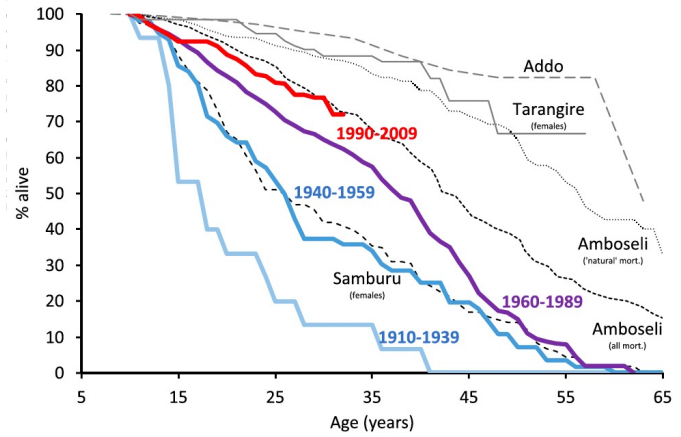
The historical development of zoo elephant survivorship

Lara Scherer[1] | Laurie Bingaman Lackey[2] | Marcus Clauss[1] | Katrin Gries[3] | David Hagan[4] | Arne Lawrenz[3] | Dennis W. H. Müller[5] | Marco Roller[6] | Christian Schiffmann[7] | Ann-Kathrin Oerke[8]

[1]Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland
[2]Hendersonville, North Carolina, USA
[3]Zoological Garden Wuppertal, Wuppertal, Germany
[4]Indianapolis Zoo, Indianapolis, Indiana, USA

Abstract

In the discussion about zoo elephant husbandry, the report of Clubb et al. (2008, Science 322: 1649) that zoo elephants had a "compromised survivorship" compared to certain non-zoo populations is a grave argument, and was possibly one of the triggers of a large variety of investigations into zoo elephant welfare, and changes in



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RESEARCH ARTICLE

ZOOBIOLOGY WILEY

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Anita Wittwer[1] | Marco Roller[2] | Dennis W. H. Müller[3] | Mads F. Bertelsen[4] | Laurie Bingaman Lackey[5] | Beatrice Steck[6] | Rebecca Biddle[7] | Lars Versteege[8] | Marcus Clauss[1]

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[3]Zoological Garden Halle (Saale), Halle, Germany
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[6]Zoological Garden of Basel, Basel, Switzerland
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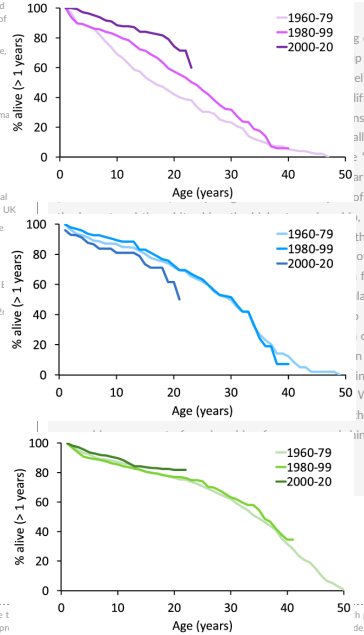

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We recommend detailed
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Does zoo giraffe survivorship improve over historical time?

How does it compare to information from natural habitats?

SPECIES 360

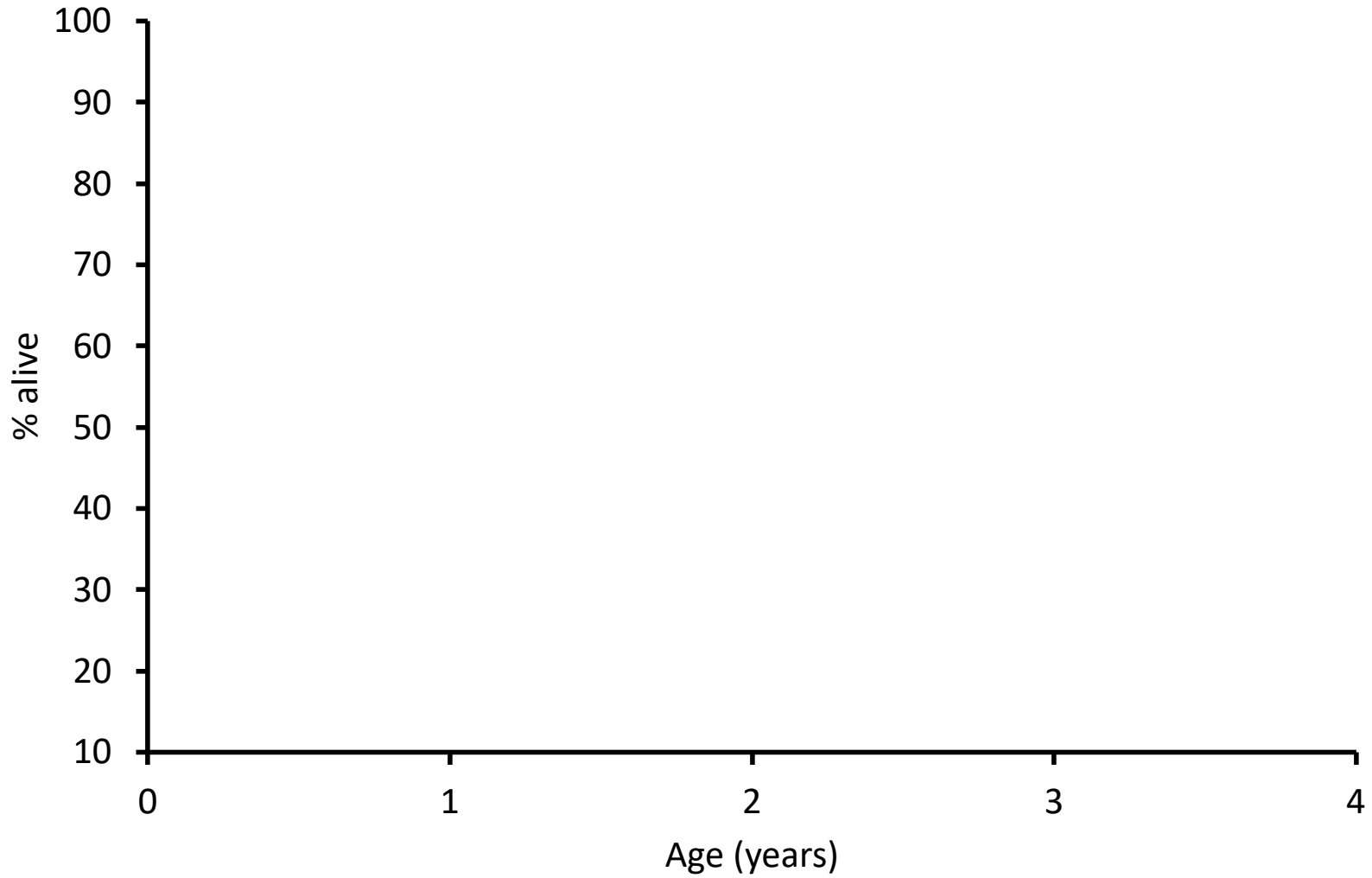
Global information serving conservation.

SPECIES 360

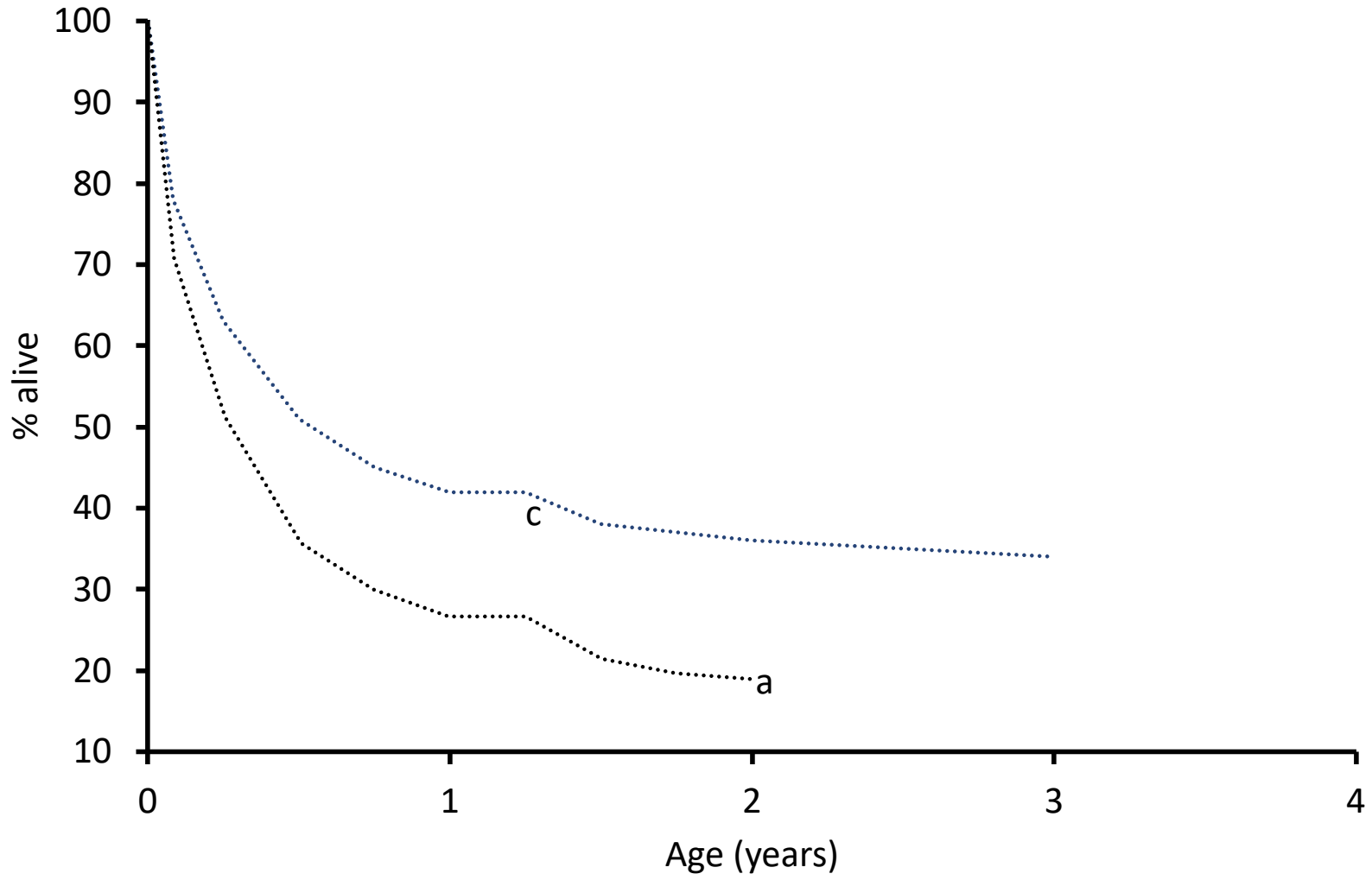
Global information serving conservation.

Birth and death data (and information on origin and sex) for global zoo giraffes (all species/hybrids) for 6048 individuals from 1900-2022.

Juvenile survivorship

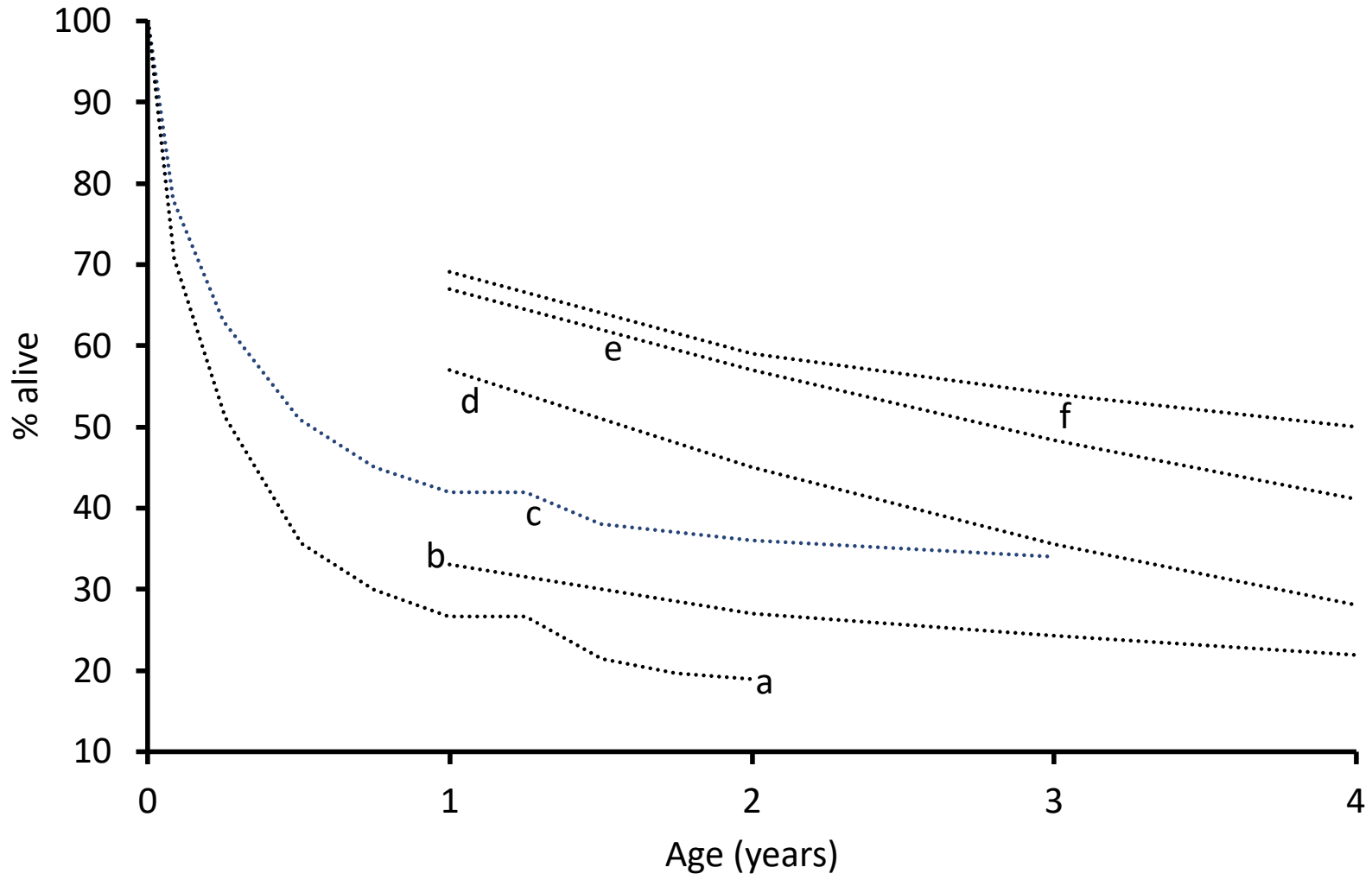


Juvenile survivorship



a - (Foster & Dagg, 1972; read from graph); b - (Leuthold & Leuthold, 1978); c - (Pellew, 1983; read from graph); d,e - (Strauss et al., 2015); f - (Lee & Bond, 2022).

Juvenile survivorship



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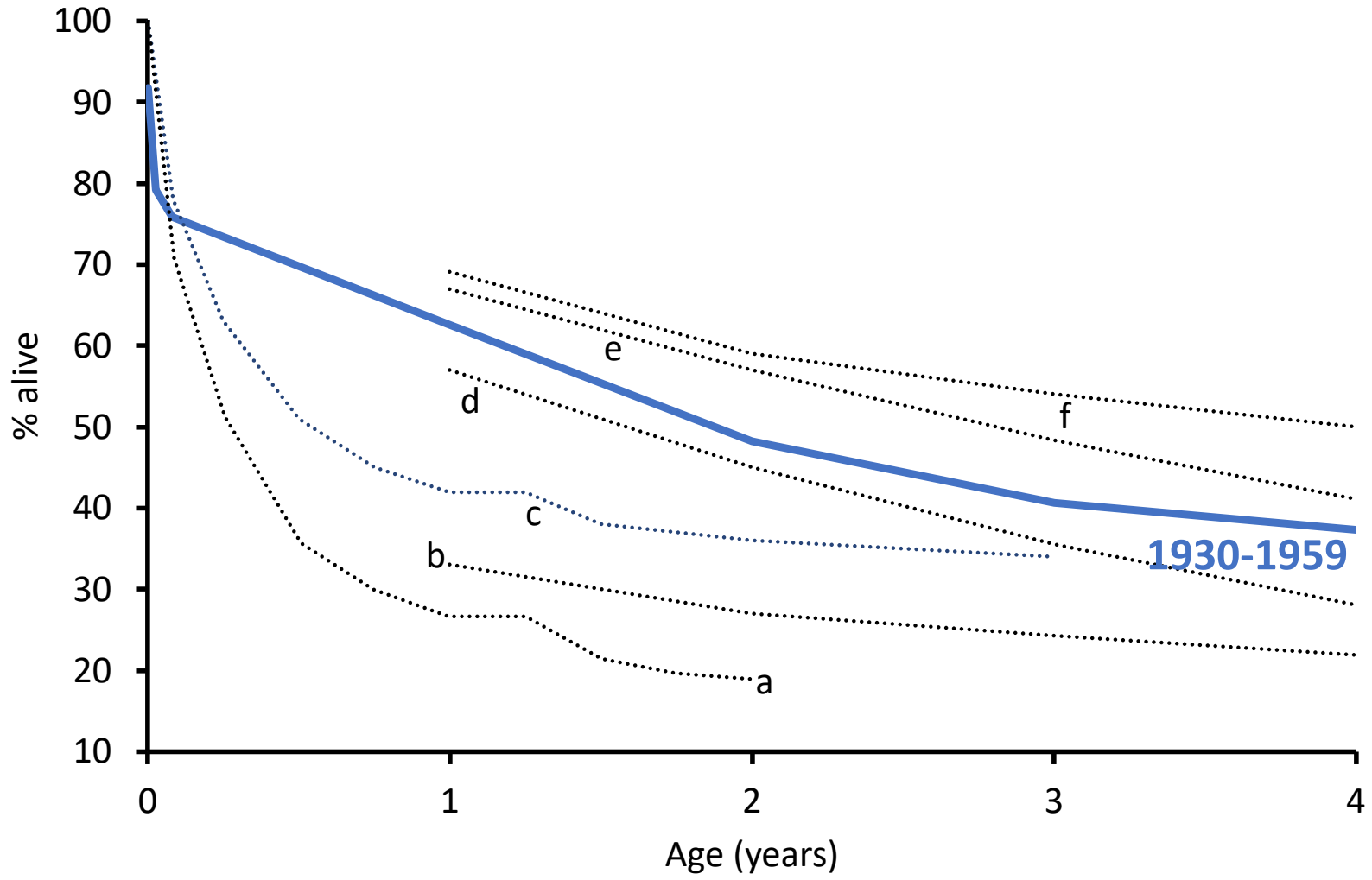

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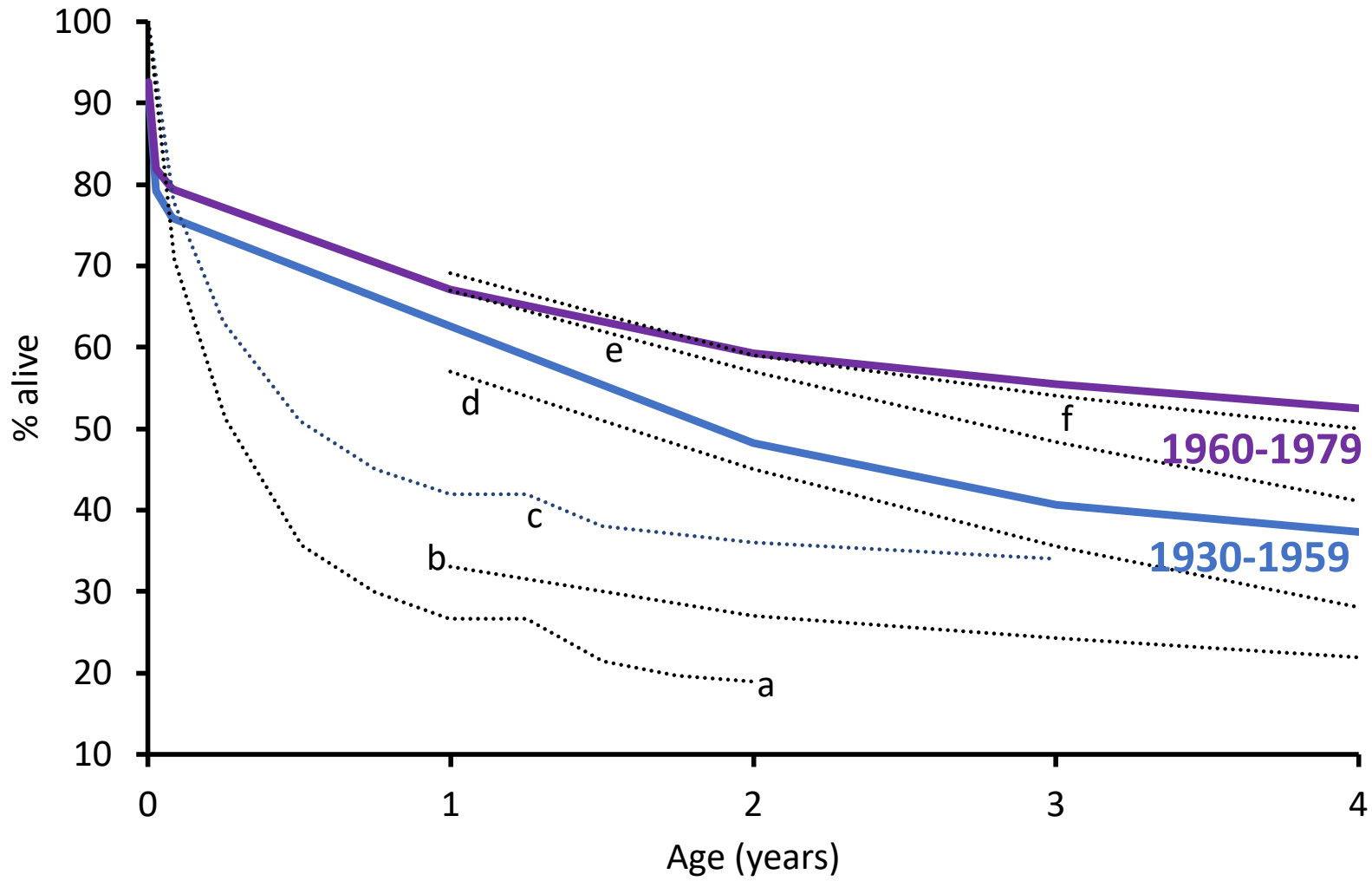
Juvenile survivorship



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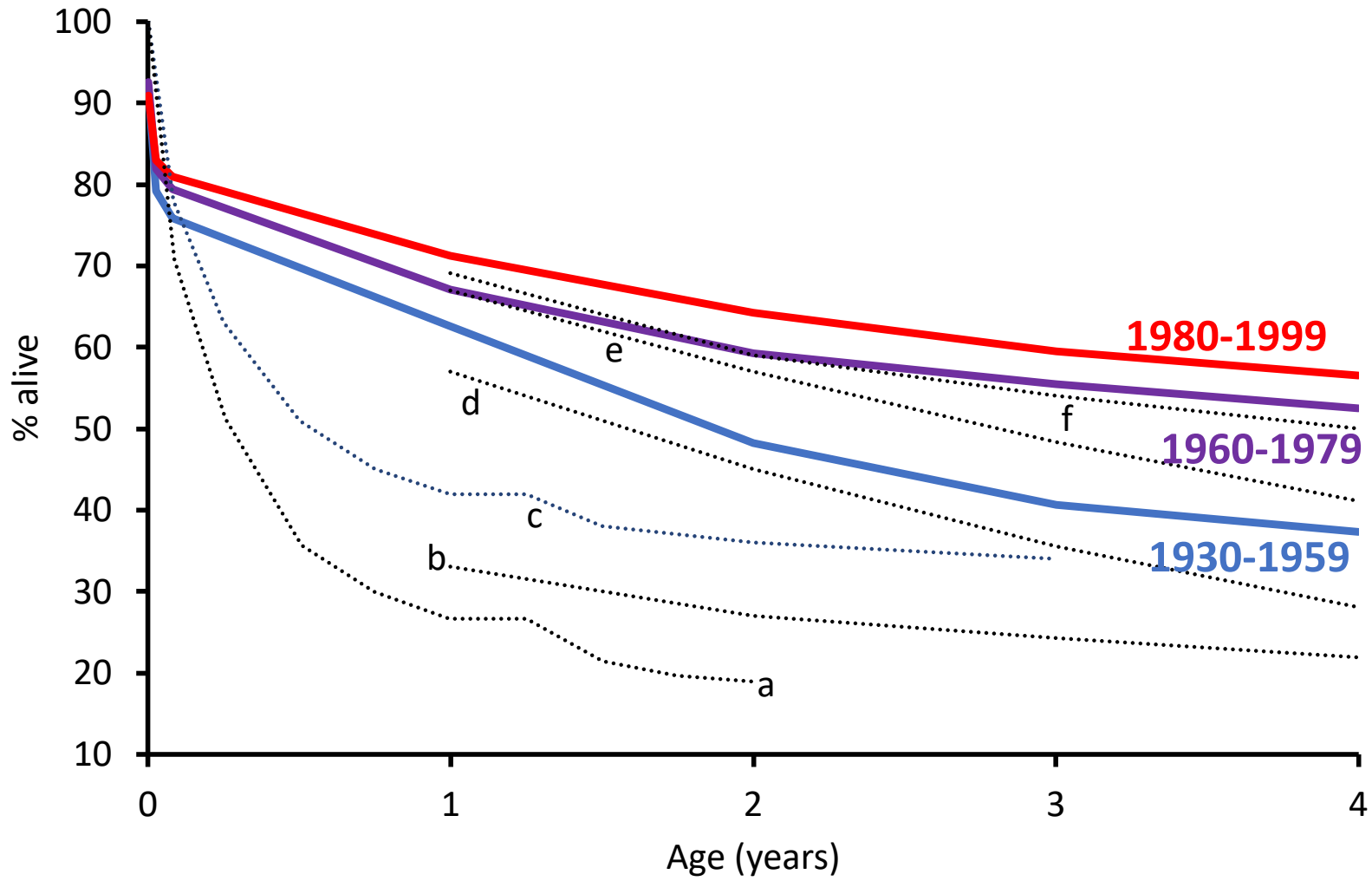

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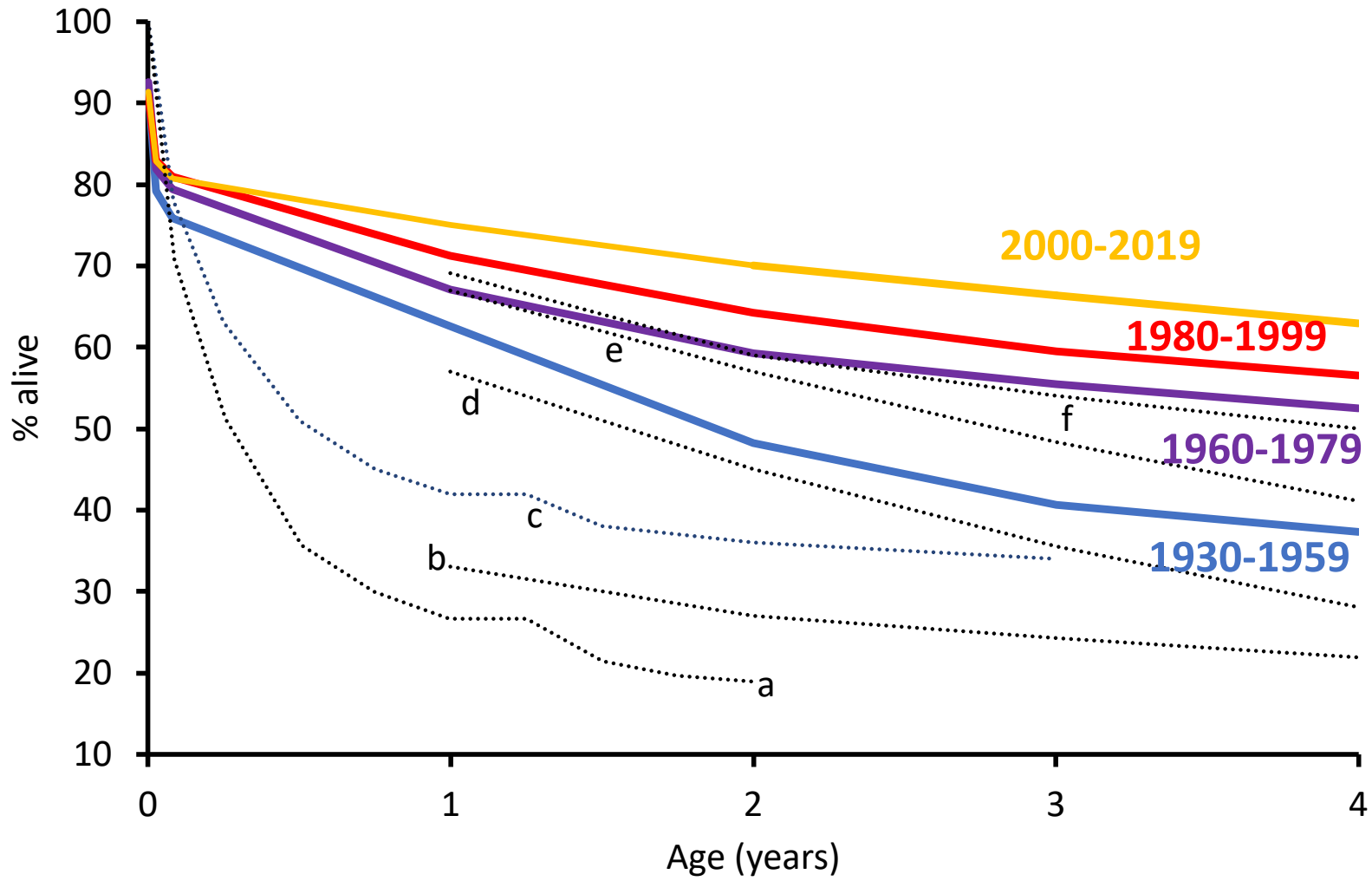

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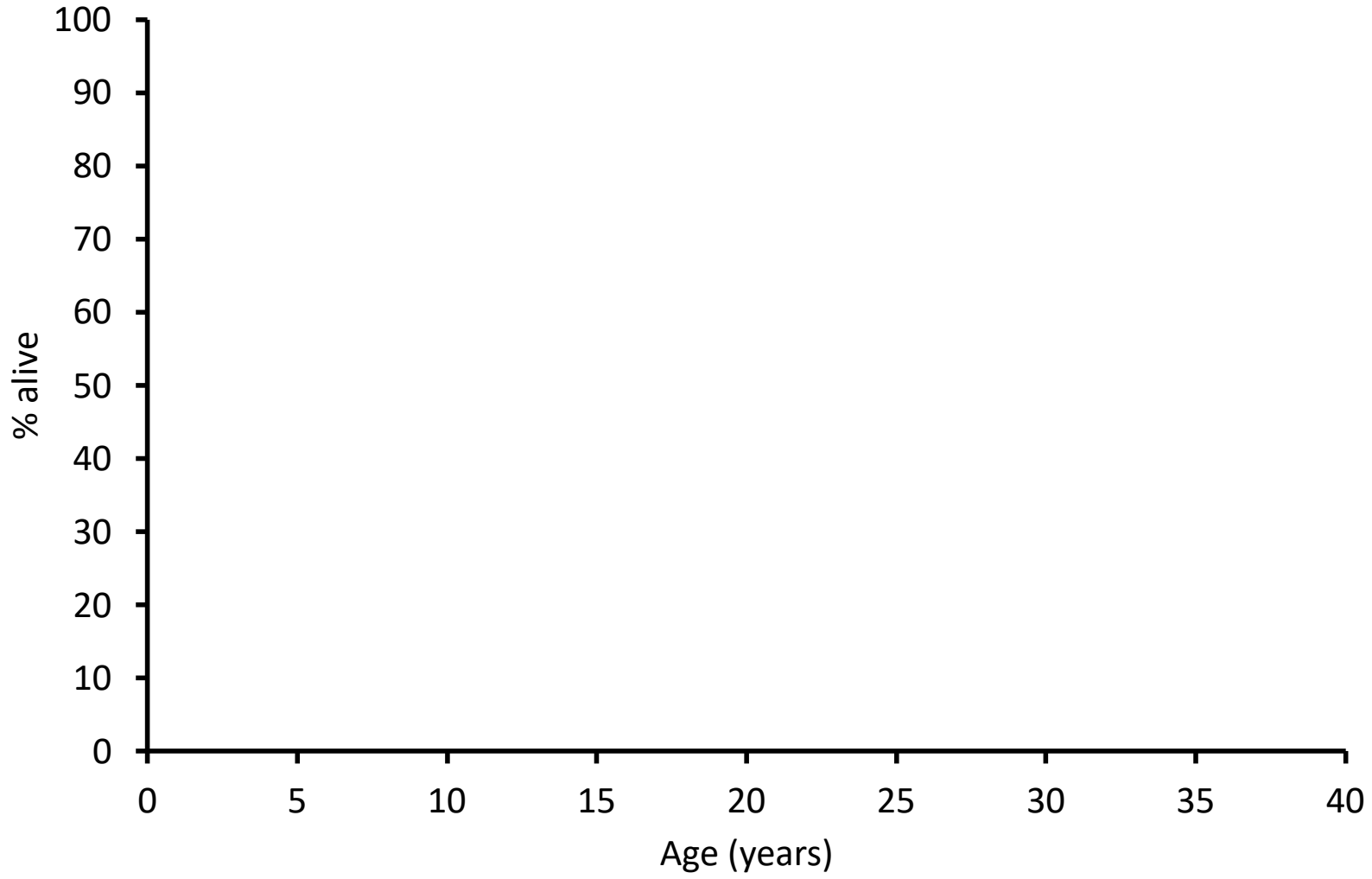
Adult survivorship



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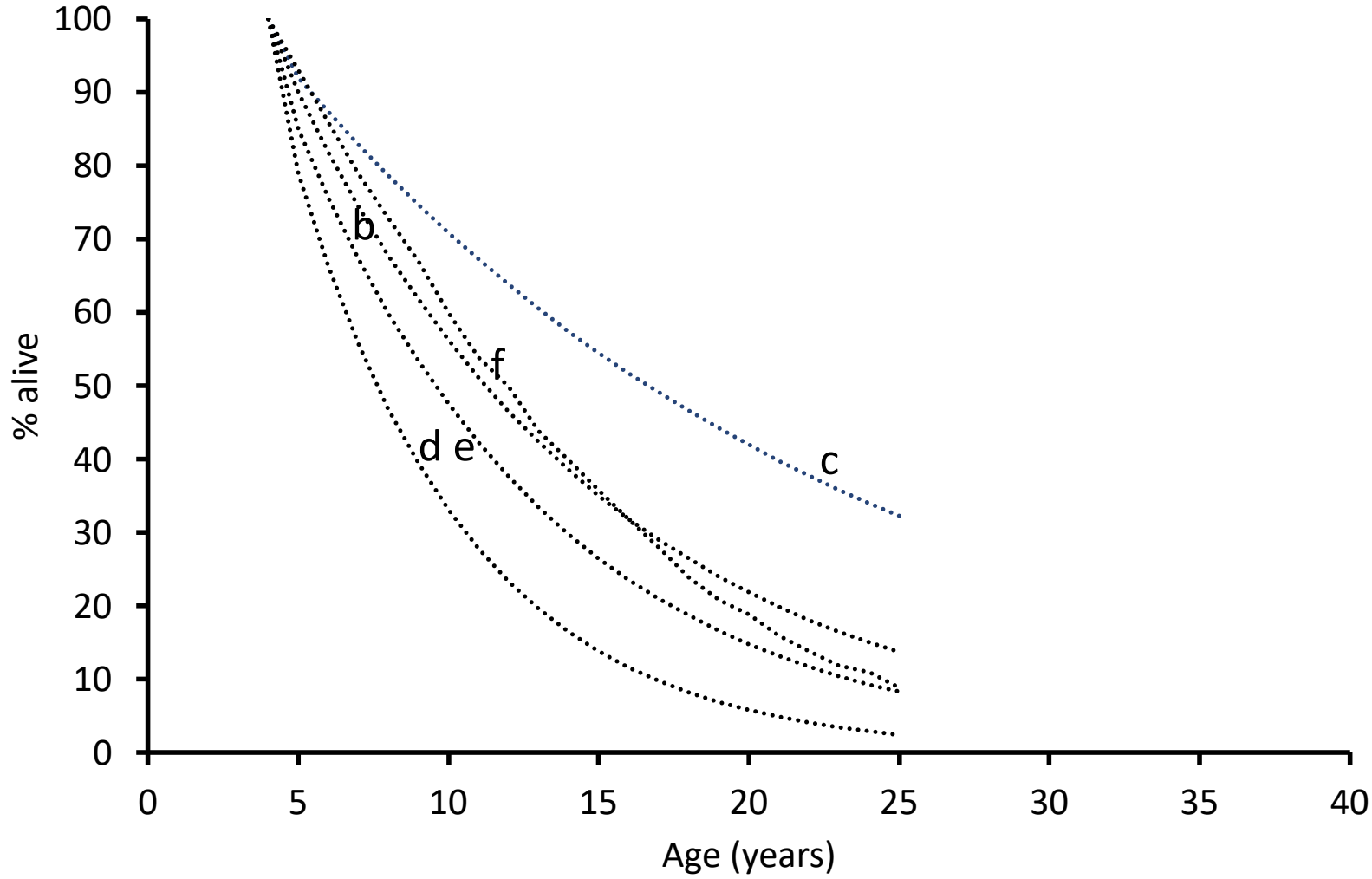

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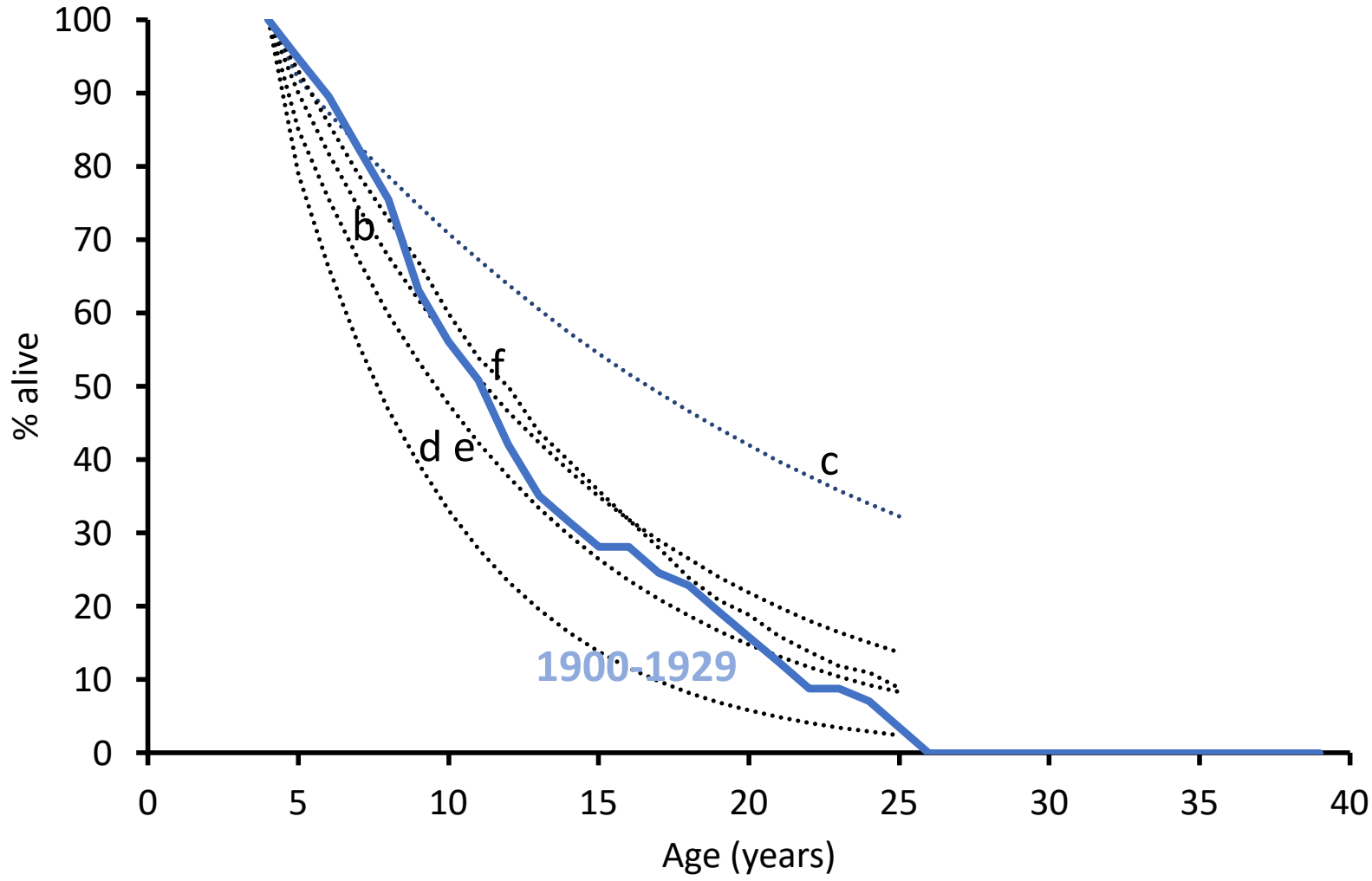

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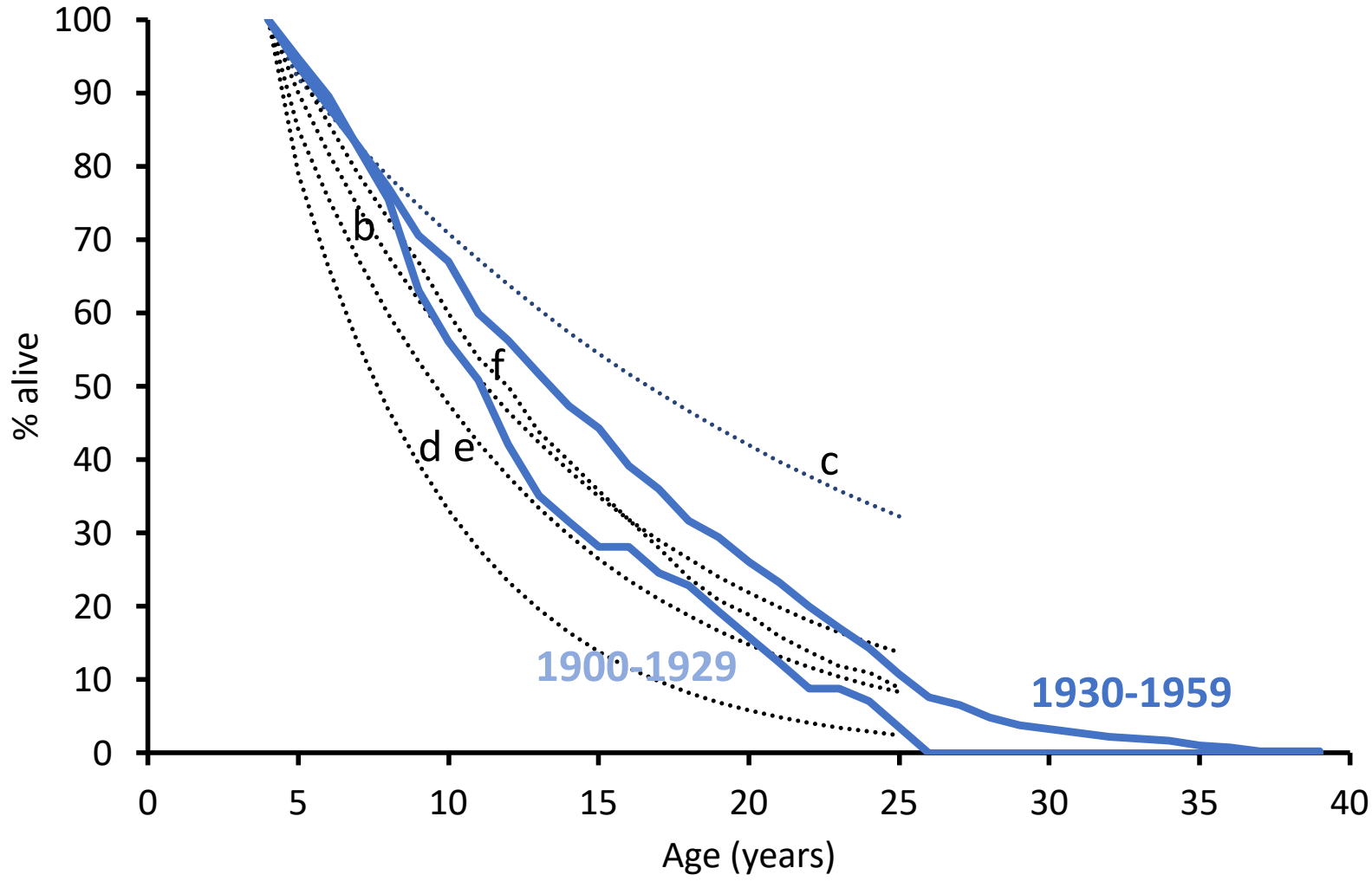

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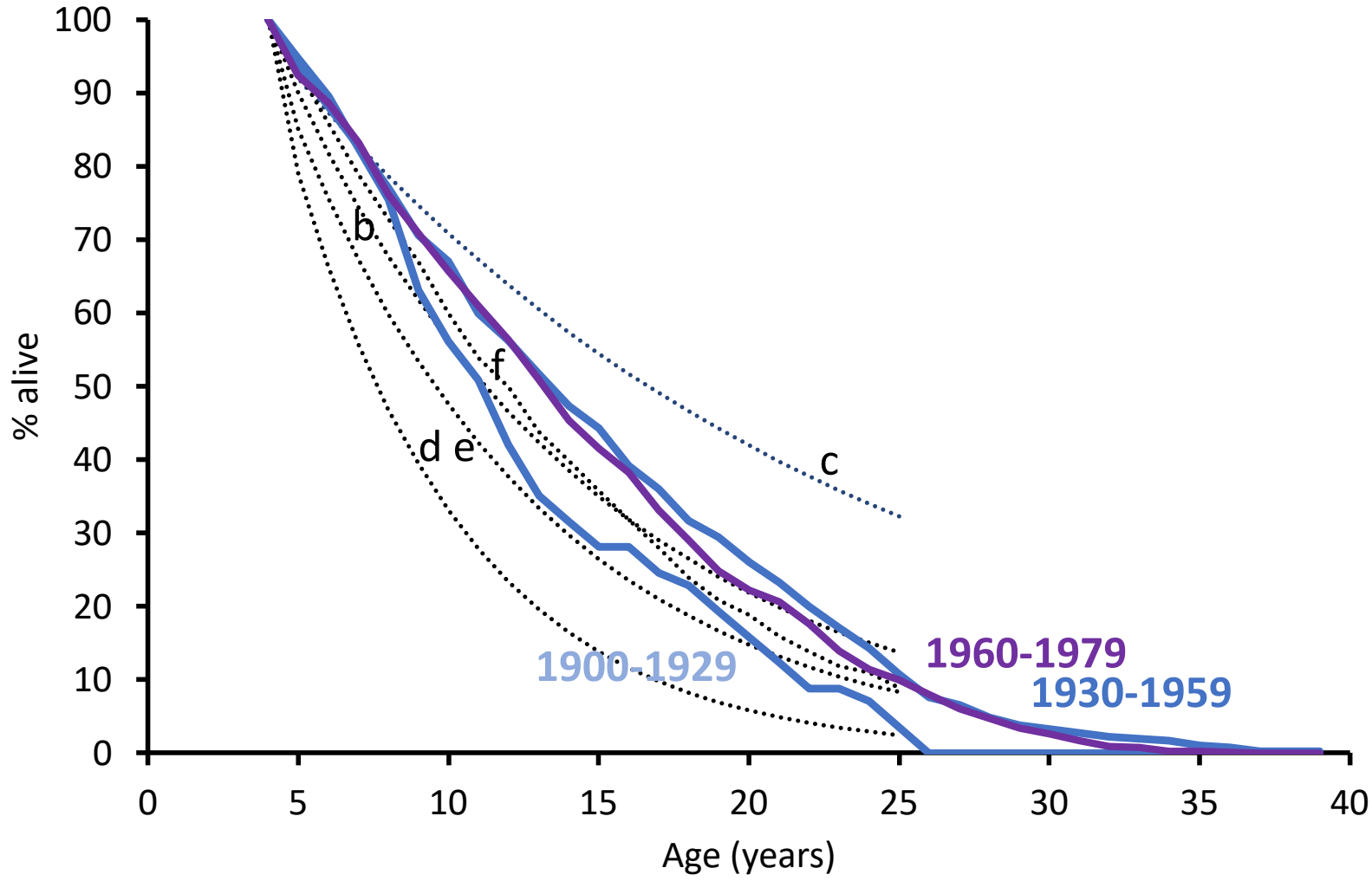

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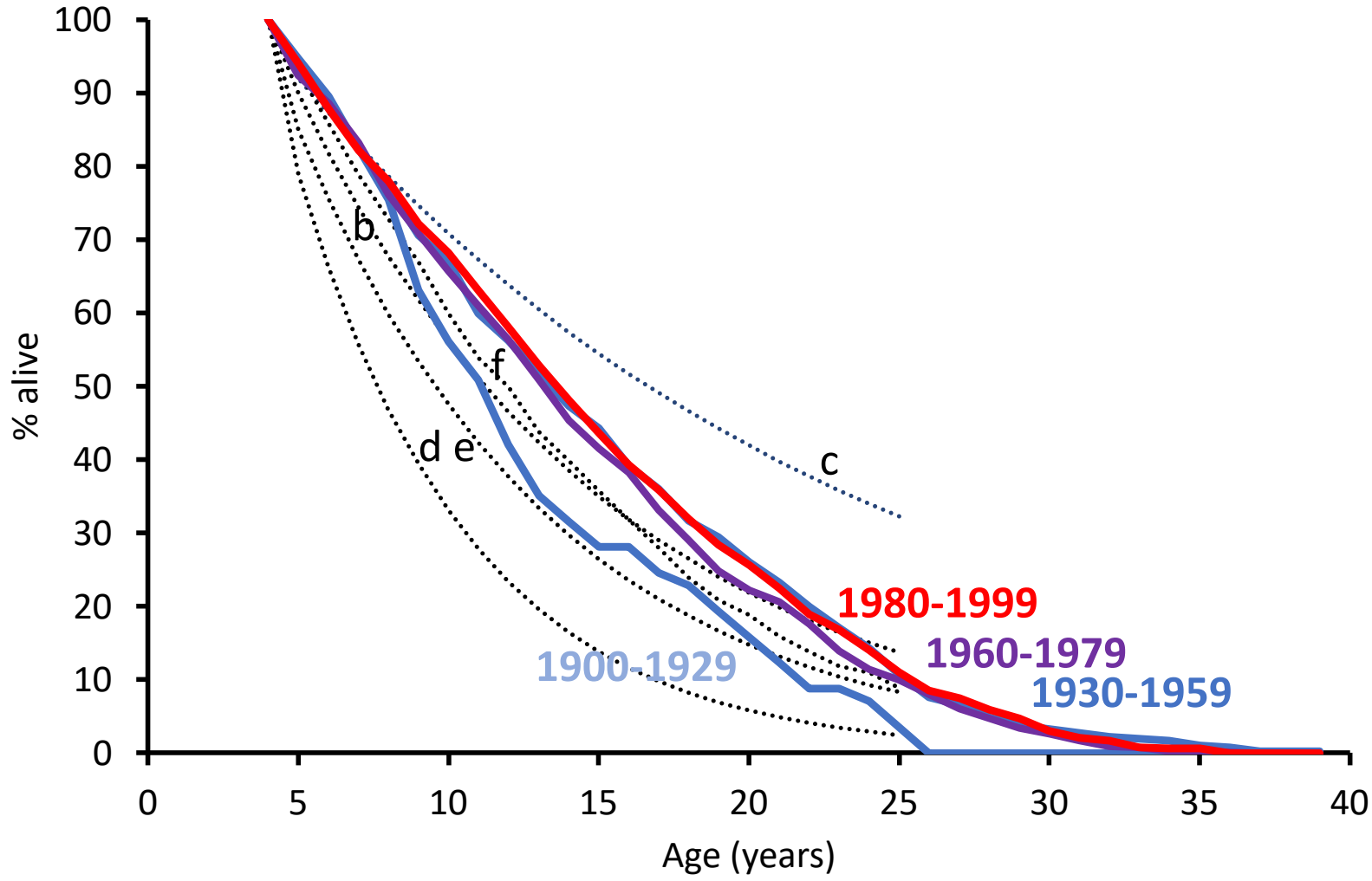

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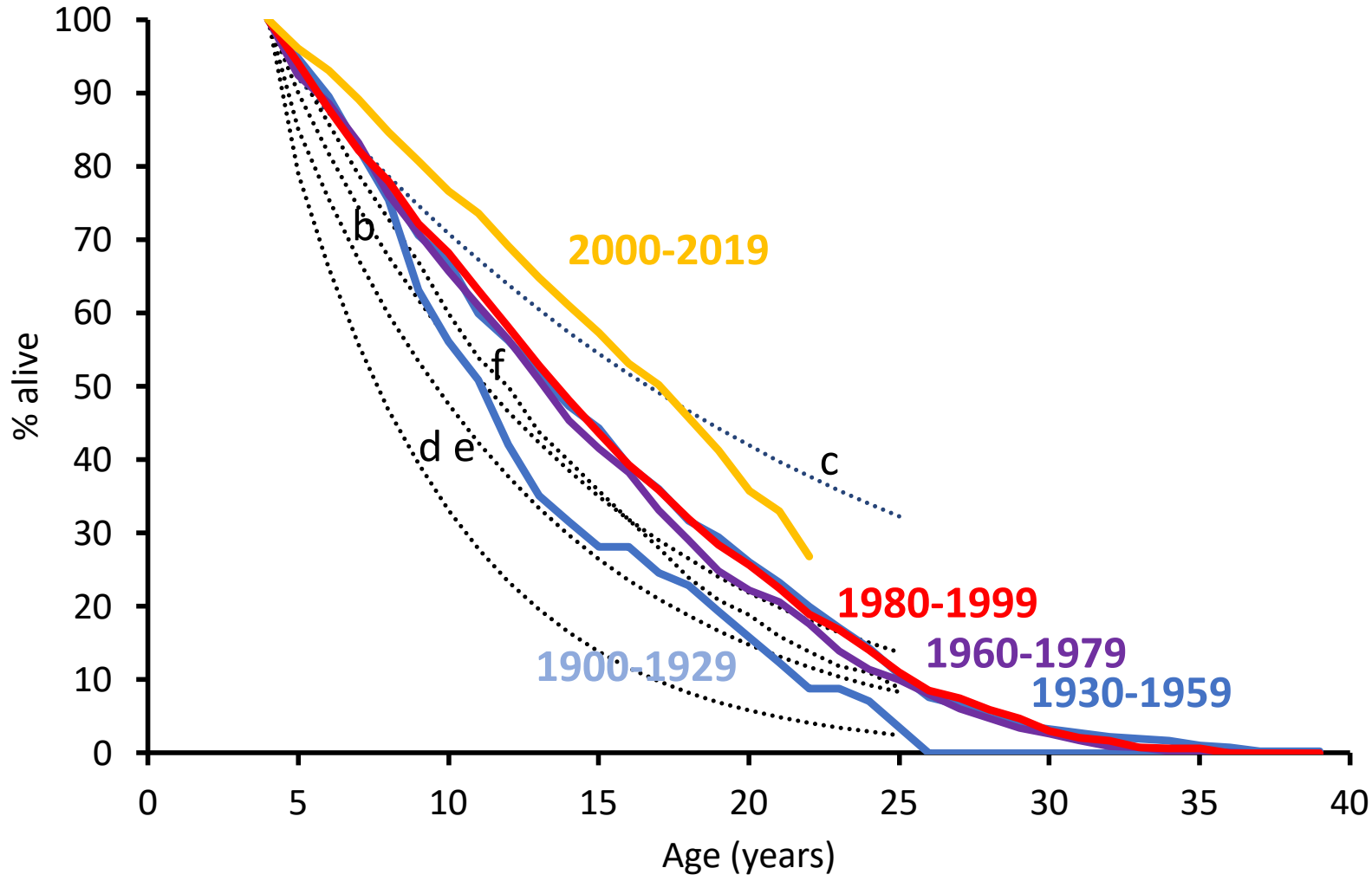

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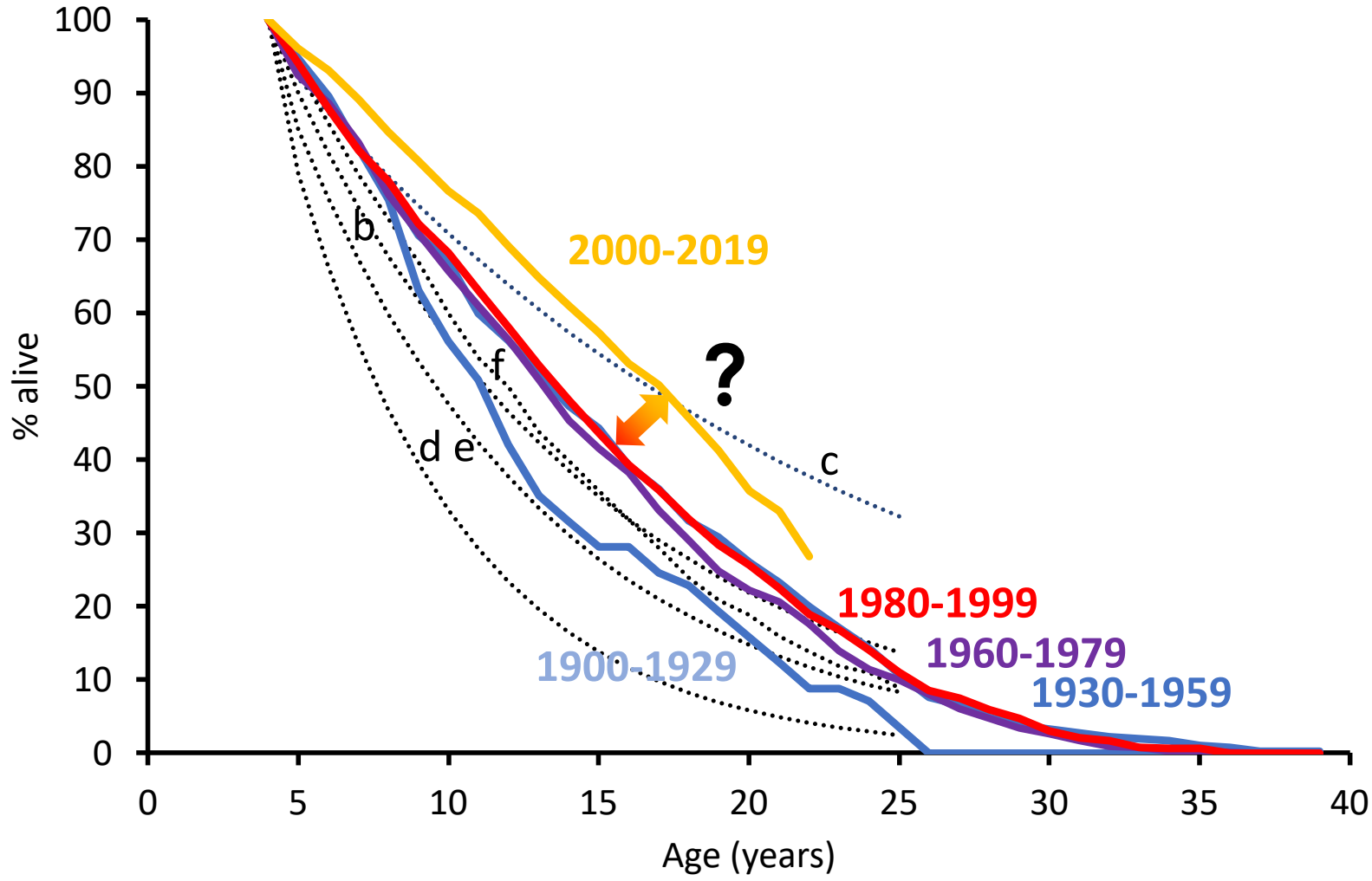

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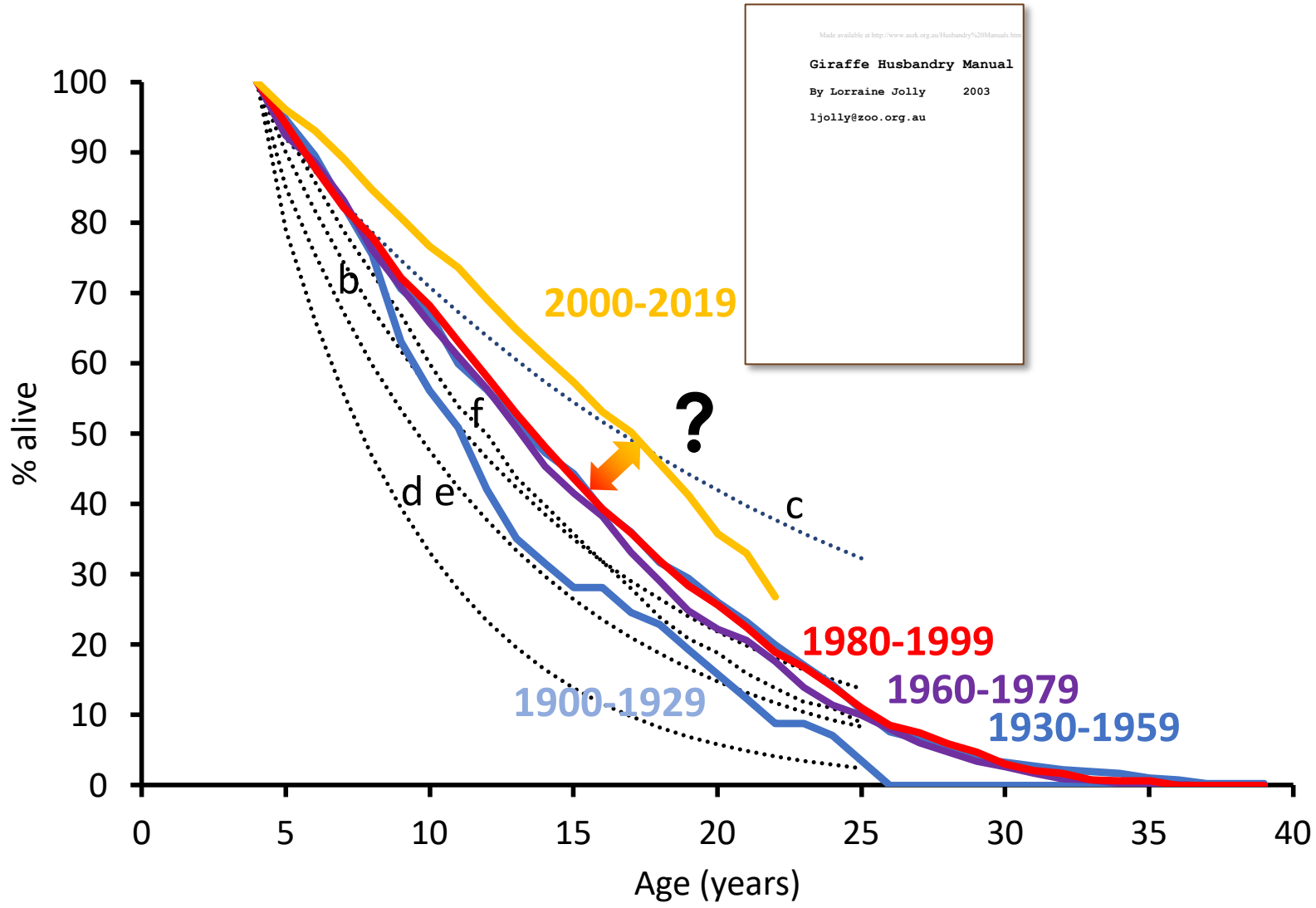


Made available at http://www.asdk.org.au/Husbandry%20Manuals.htm

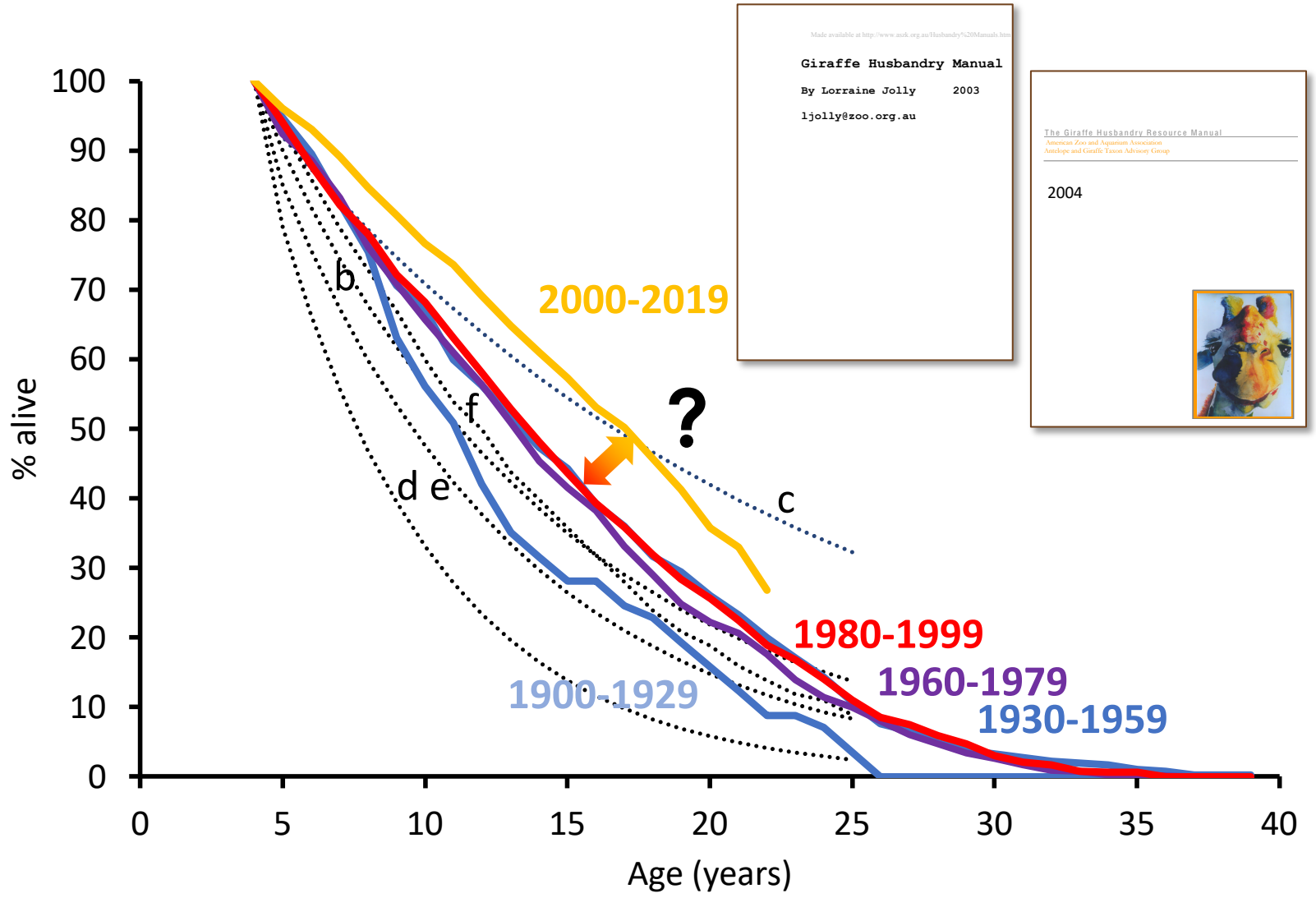
Giraffe Husbandry Manual

By Lorraine Jolly 2003

ljolly@zoo.org.au

b - (Leuthold & Leuthold, 1978); c - (Pellew, 1983; read from graph); d,e - (Strauss et al., 2015); f - (Lee & Bond, 2022).

Adult survivorship



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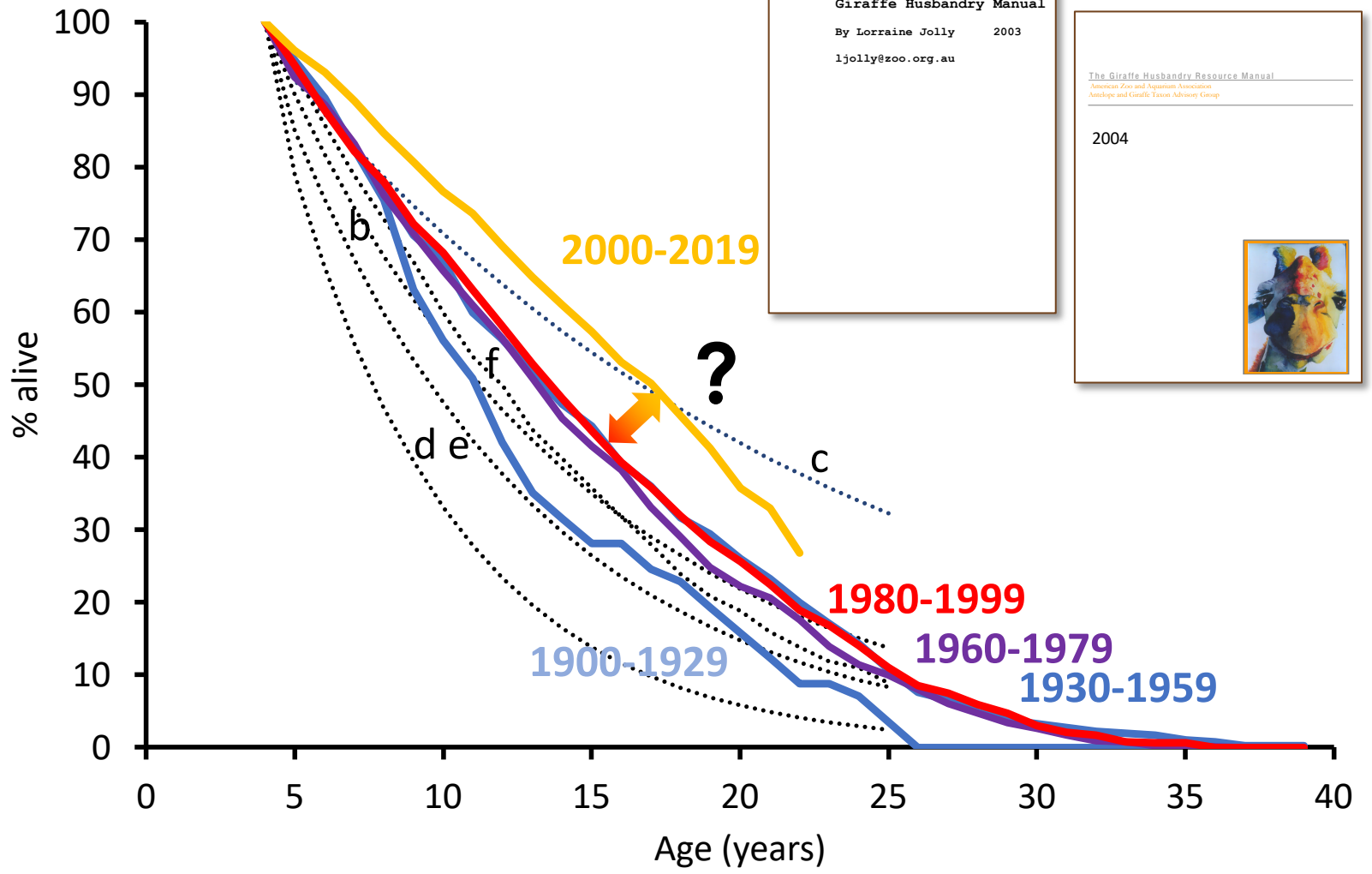

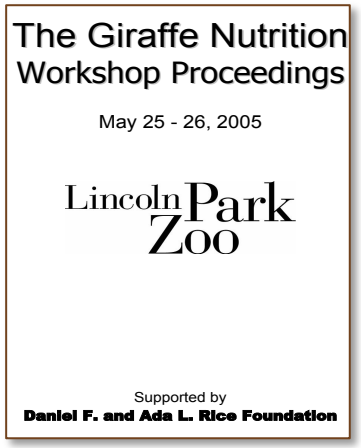

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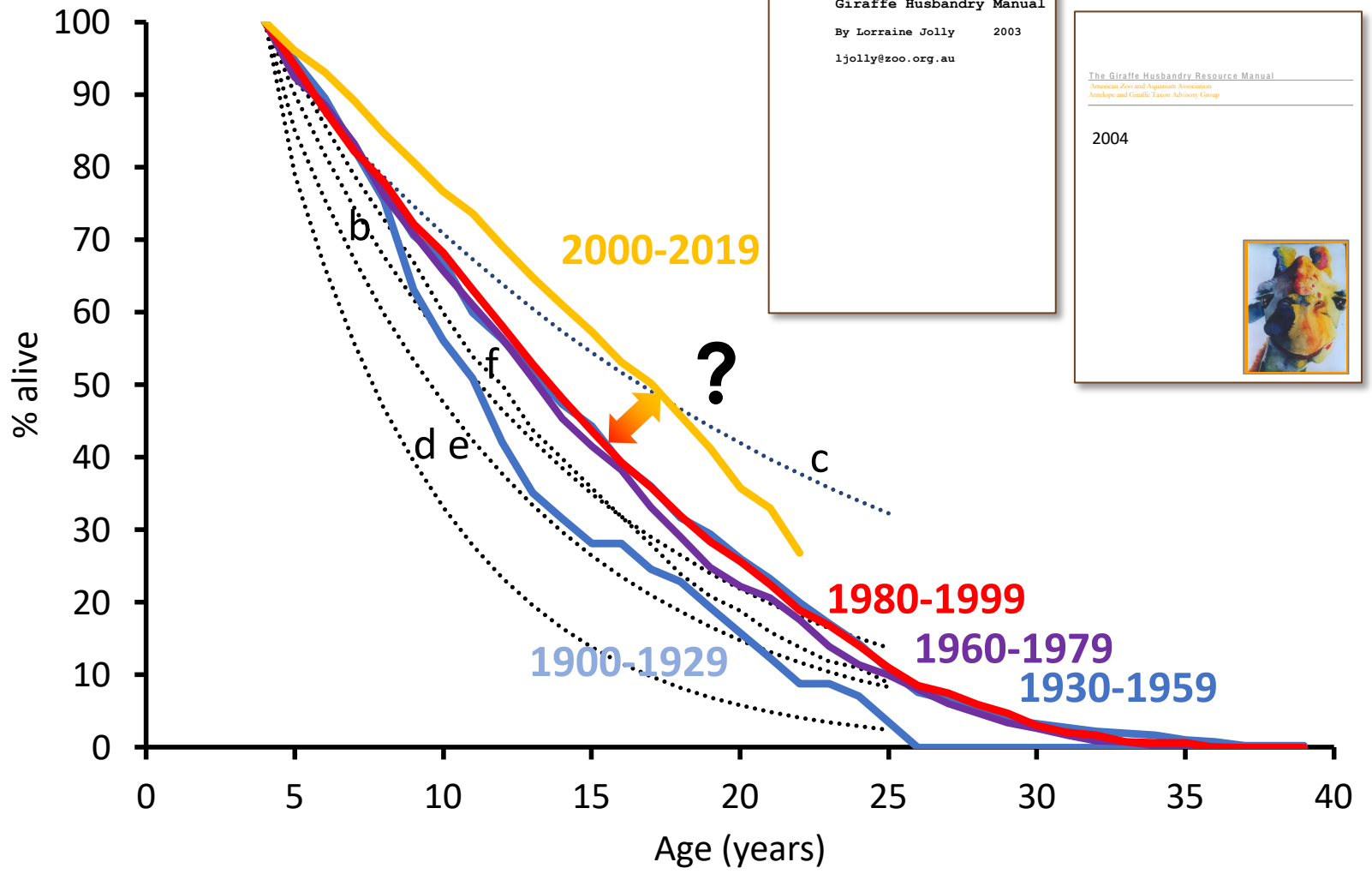

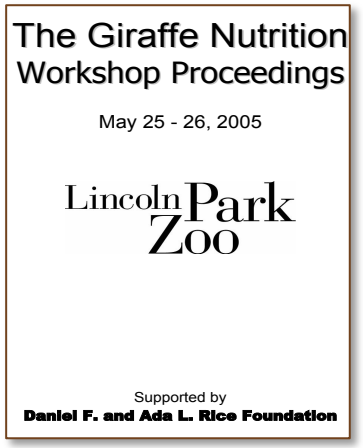

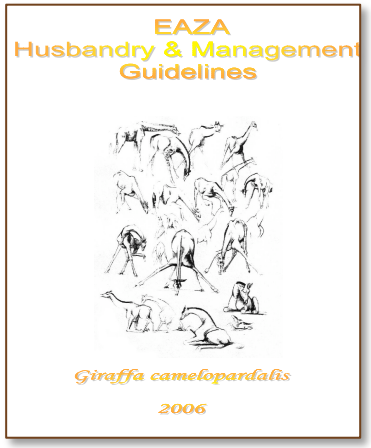

b - (Leuthold & Leuthold, 1978); c - (Pellew, 1983; read from graph); d,e - (Strauss et al., 2015); f - (Lee & Bond, 2022).

Relative life expectancy in zoo ruminants

Mating system, feeding type and *ex situ* conservation effort determine life expectancy in captive ruminants

Dennis W. H. Müller[1,*], Laurie Bingaman Lackey[2], W. Jürgen Streich[3], Jörns Fickel[3], Jean-Michel Hatt[1] and Marcus Clauss[1]

Proc. R. Soc. B (2011) **278**, 2076–2080

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Proc. R. Soc. B (2011) **278**, 2076–2080

Question:
Is there an effect on relative life expectancy of whether or not a WAZA Studbook exists?

Relative life expectancy in zoo ruminants

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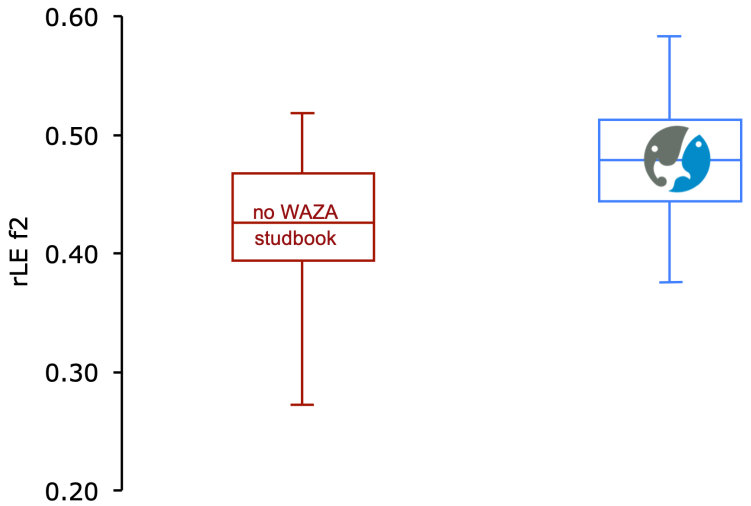
Proc. R. Soc. B (2011) **278**, 2076–2080



Question:
Is there an effect on relative life expectancy of whether or not a WAZA Studbook exists?

Answer:
Yes.

If we keep them alive for longer, does that mean someone gives us more holding space ?

Marius 2014

11 February 2014, 5.50am GMT

Death of Marius the giraffe reveals cultural differences in animal conservation

Marius 2014

11 February 2014, 5.50am GMT

Death of Marius the giraffe reveals cultural differences in animal conservation

Slide by M. Bertelsen

Marius, the Giraffe: A Comparative Informatics Case Study of Linguistic Features of the Social Media Discourse

Chris Zimmerman[1], Yuran Chen[1], Daniel Hardt[1], and Ravi Vatrapu[1, 2]

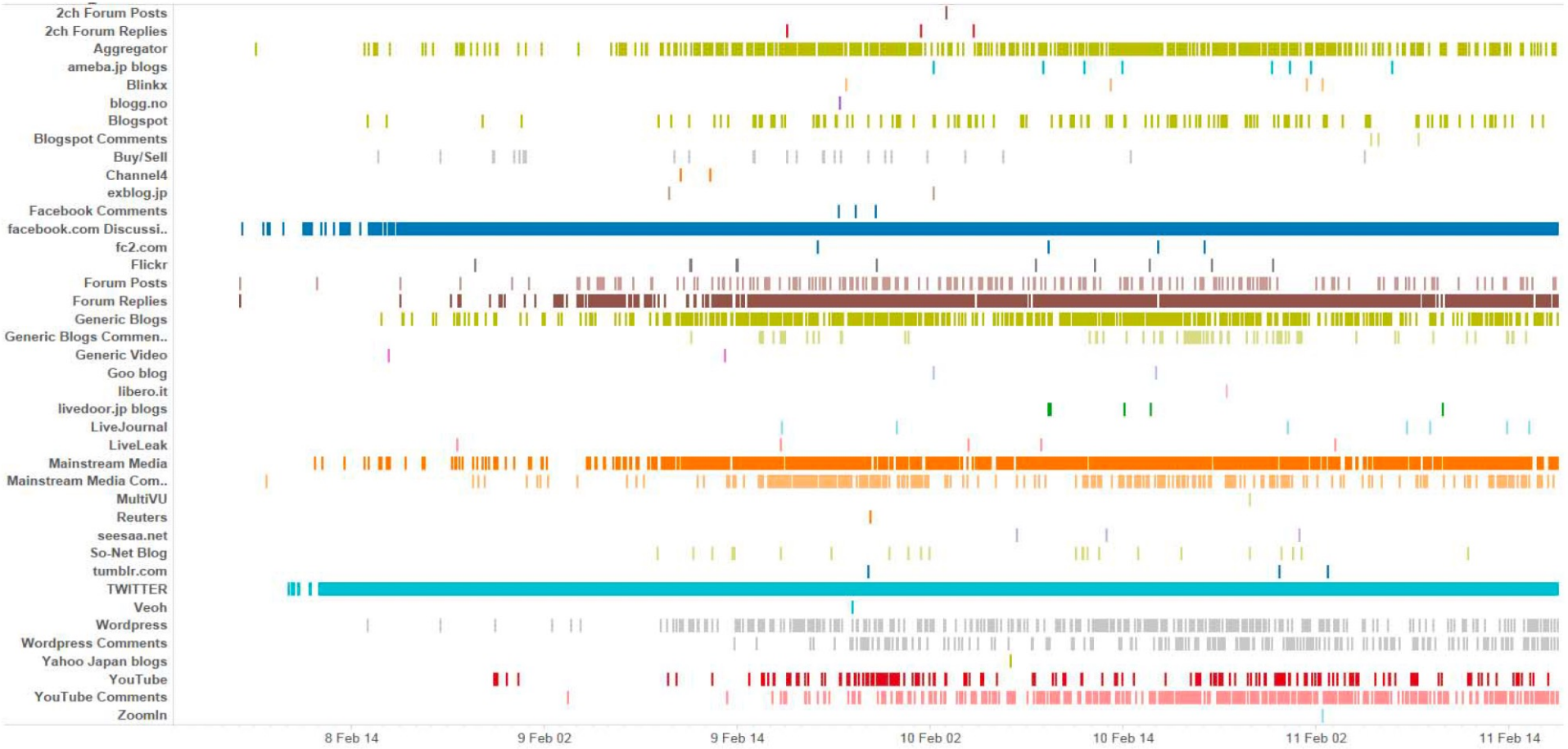


Figure 2: Whole data collection across channels and over time – A strip plot distribution of activities shows which channels were more consistently present during real world events at the Copenhagen Zoo, revealing differing activity footprints

What we like to see when …

What we like to see when …

What we like to see when …

TOURISM RECREATION RESEARCH, 2016
VOL. 41, NO. 2, 168–176
http://dx.doi.org/10.1080/02508281.2016.1147211

Routledge
Taylor & Francis Group

The elimination of Marius, the giraffe: humanitarian act or callous management decision?

Erik Cohen[a] and David Fennell[b]

TEXT AND PERFORMANCE QUARTERLY, 2016
VOL. 36, NO. 4, 200–211
http://dx.doi.org/10.1080/10462937.2016.1231337

NATIONAL COMMUNICATION ASSOCIATION

Routledge
Taylor & Francis Group

On the execution of the young giraffe, Marius, by the Copenhagen Zoo: Conquergood's "Lethal Theatre" and posthumanism

Craig Gingrich-Philbrook

Zoo Animals as Specimens, Zoo Animals as Friends: The Life and Death of Marius the Giraffe

Abigail Levin

©2015. *Environmental Philosophy* 12:1

Survey of U.S. Zoo and Aquarium Animal Care Staff Attitudes Regarding Humane Euthanasia for Population Management

David M. Powell,[1]* and Matthew Ardaiolo[2]

Zoo Biology 35: 187–200 (2016)

Survey of U.S.-based zoo veterinarians' attitudes on population management euthanasia

David M. Powell[1] | Joseph Lan[2] | Curtis Eng[2]

Zoo Biology. 2018;**37**:478–487.

ASSOCIATION OF ZOOS & AQUARIUMS

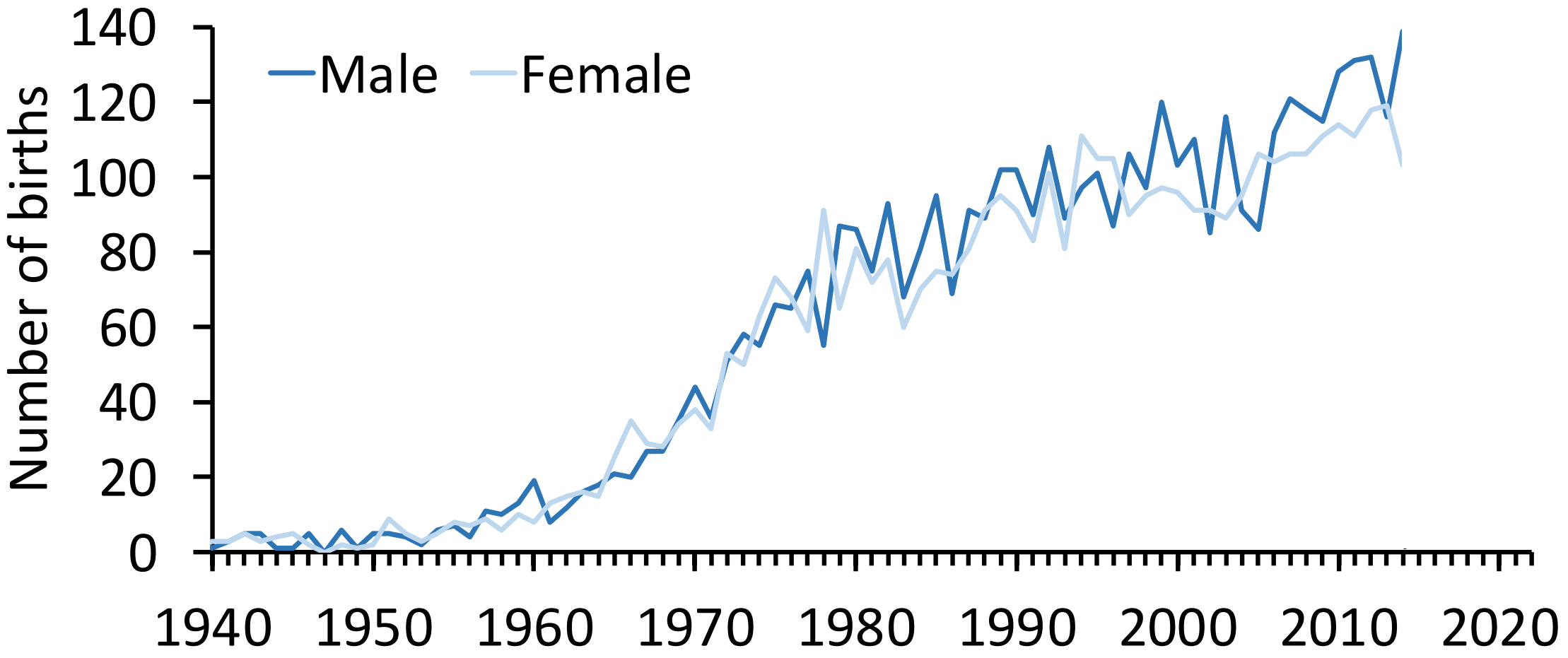
THURSDAY, FEBRUARY 13, 2014

Statement by Association of Zoos and Aquariums Regarding the Euthanasia of Giraffe at the Copenhagen

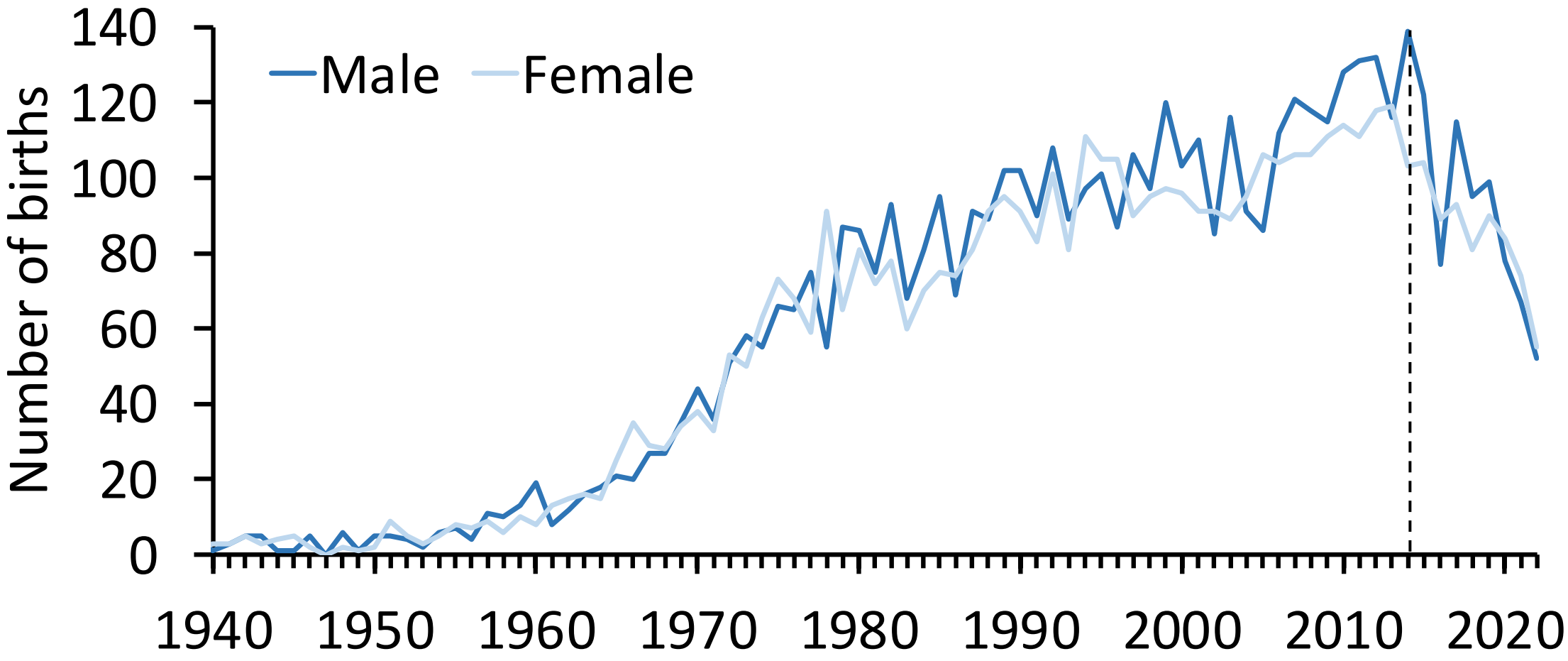
The Association of Zoos and Aquariums (AZA) issued the following statement:

The Association of Zoos and Aquariums regrets the unfortunate incident at the Copenhagen Zoo involving the death of a giraffe. Incidents of that sort do not happen at AZA-accredited zoos and aquariums for several reasons:

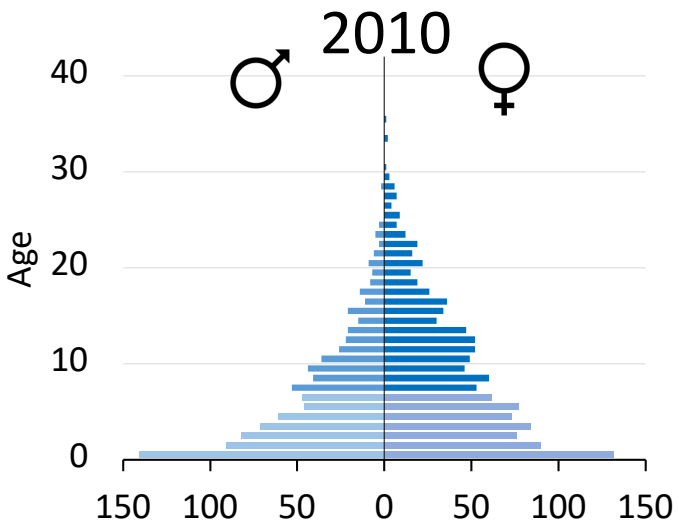
Global zoo giraffe births



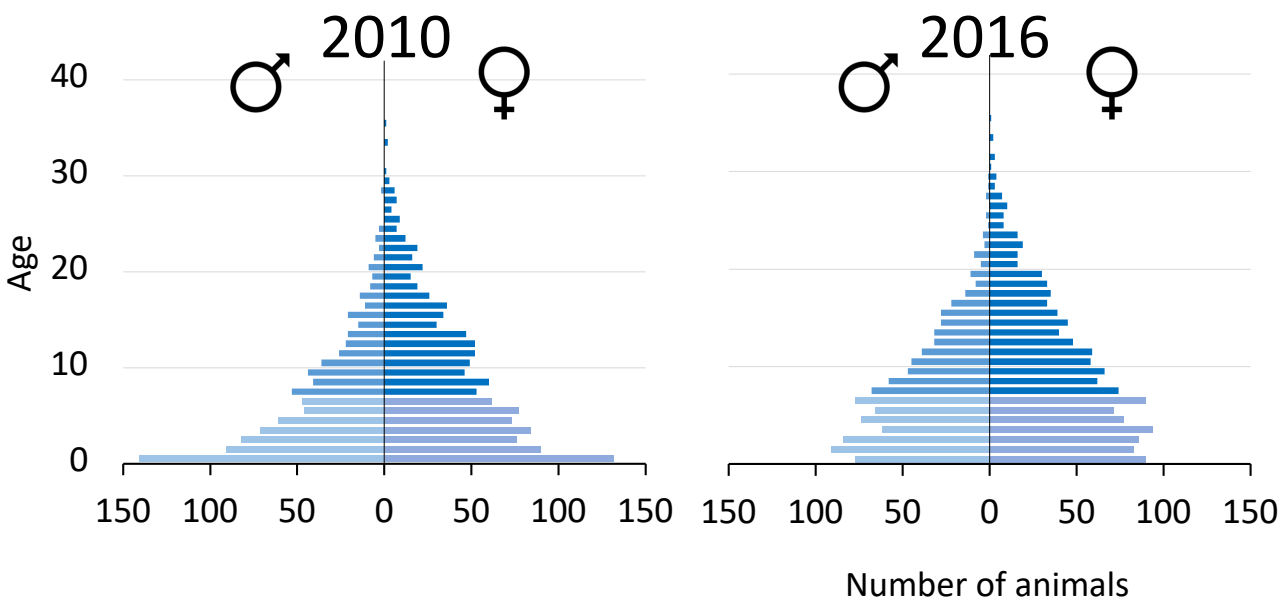
Global zoo giraffe births



Rapid demographic transition



Rapid demographic transition



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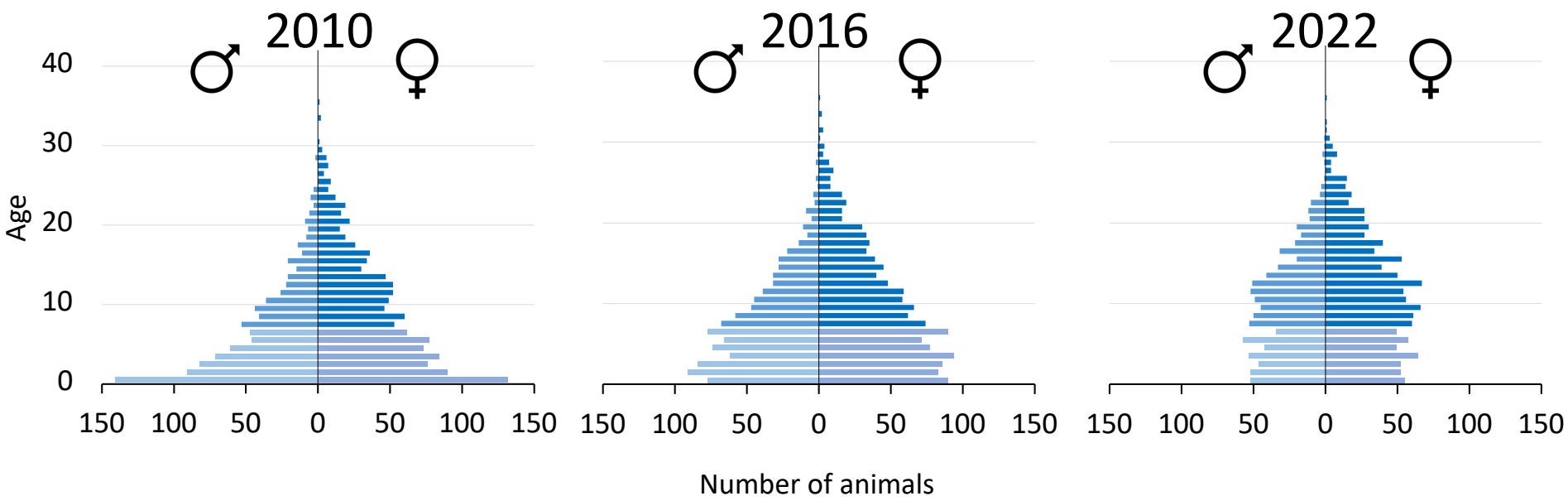

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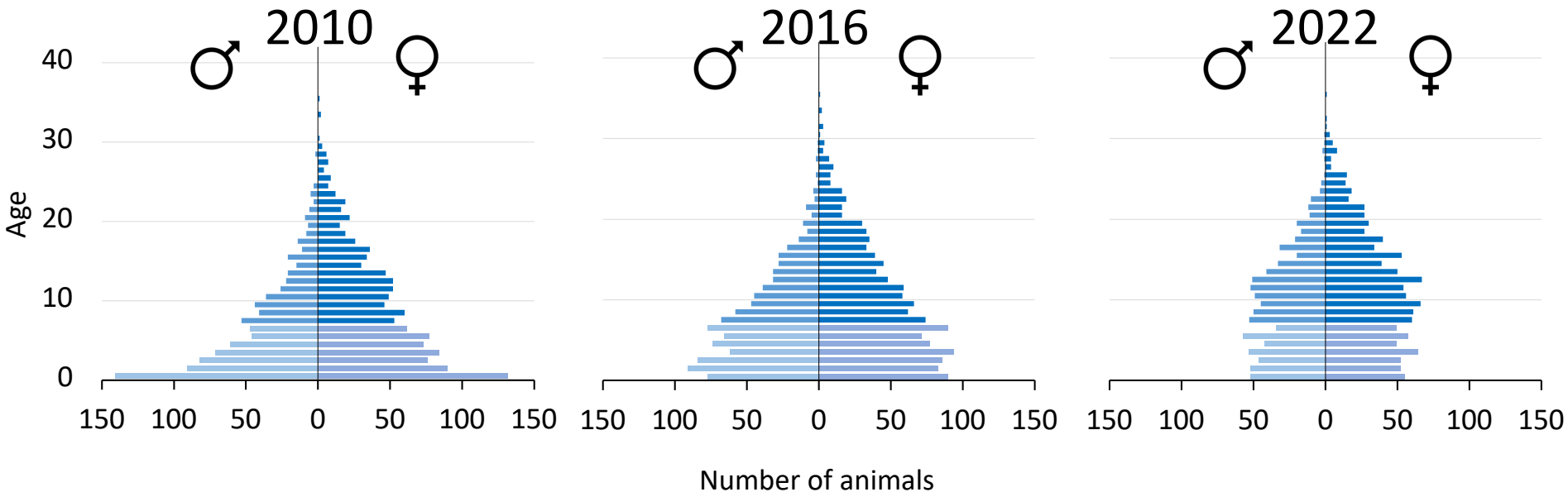

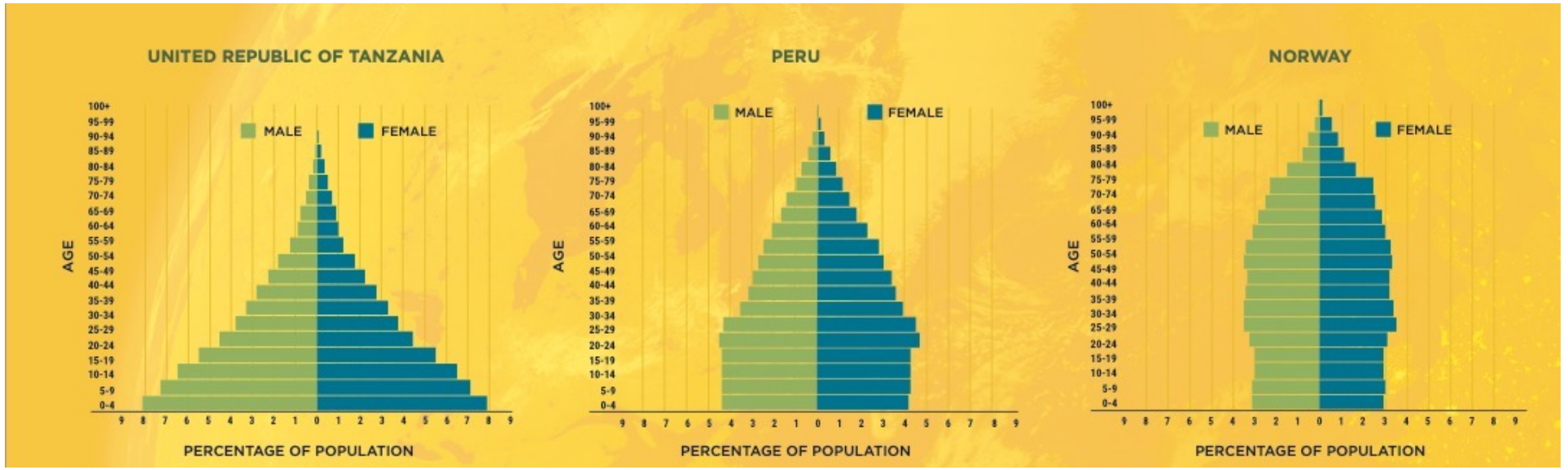

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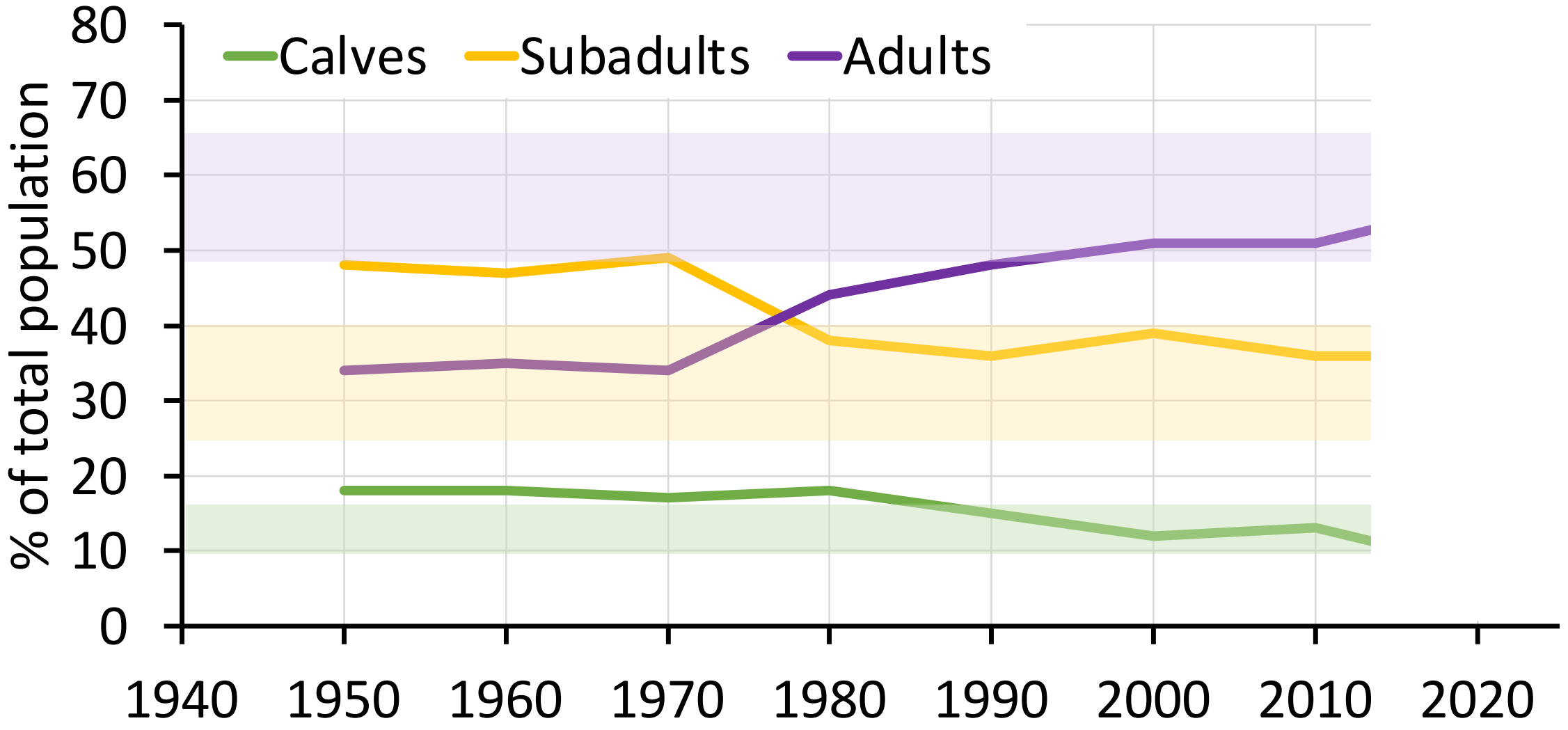

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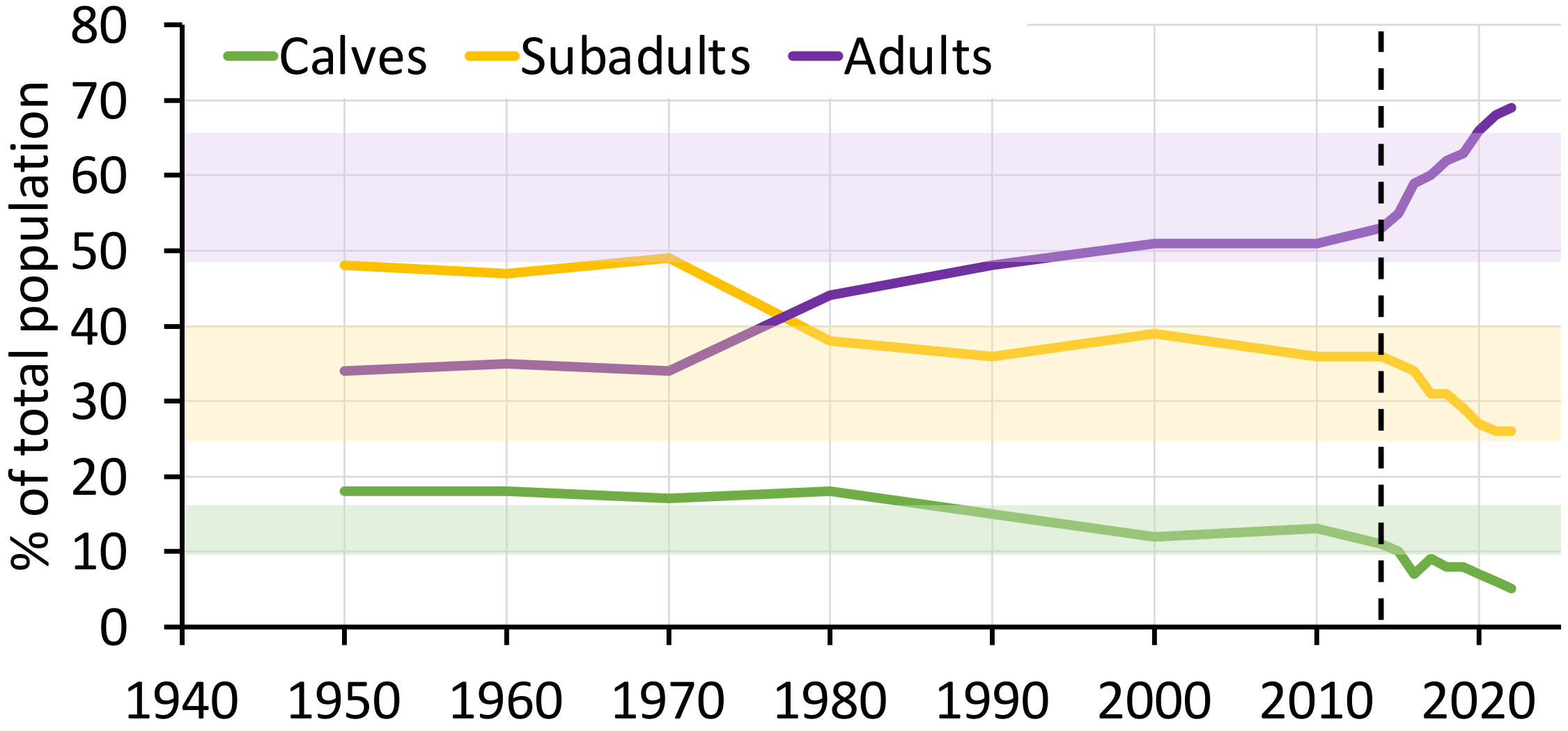


The alternatives

The alternatives

The alternatives

‘natural breeding’ with intact social structures with adequate space, enclosure structure, diet, enrichment, ‘death at home’

The alternatives

‘natural breeding’ with intact social structures with adequate space, enclosure structure, diet, enrichment, ‘death at home’

culling at dispersal age

The alternatives

‘natural breeding’ with intact social structures with adequate space, enclosure structure, diet, enrichment, ‘death at home’

culling at dispersal age

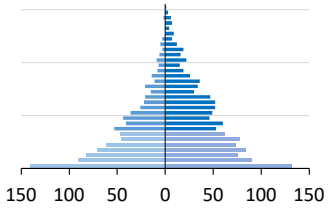
experienced animals and staff

The alternatives

‘natural breeding’ with intact social structures with adequate space, enclosure structure, diet, enrichment, ‘death at home’

culling at dispersal age

experienced animals and staff
safe population management



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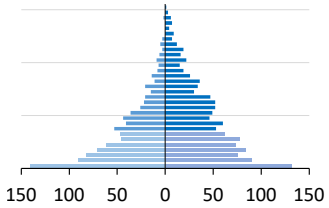

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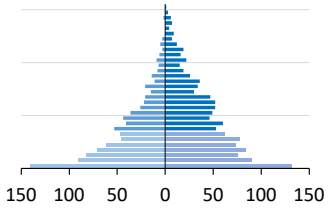
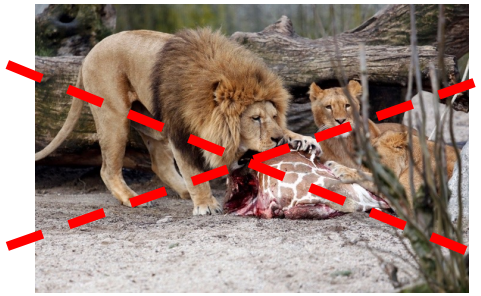


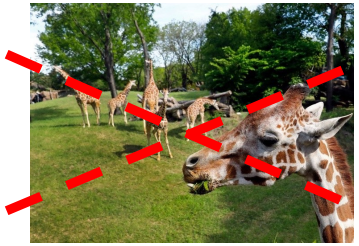
experienced animals and staff
safe population management

sustainability

education: nature conservation, accountability, transparency – ***no illusory dream world***

The alternatives





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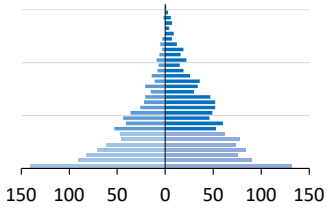
culling at dispersal age



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sustainability

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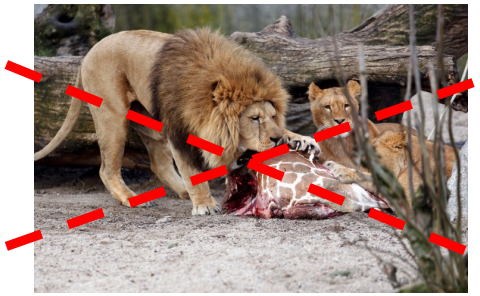
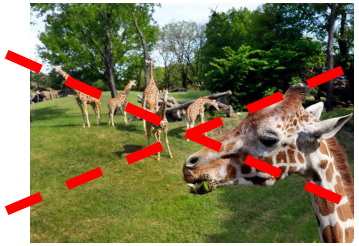
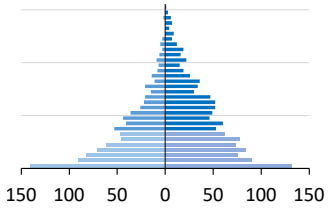




~~'natural breeding'~~ ~~with intact social structures~~ with adequate space, enclosure structure, diet, enrichment, ~~'death at home~~'

contraception consequences

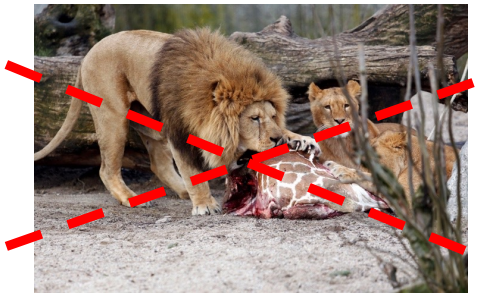


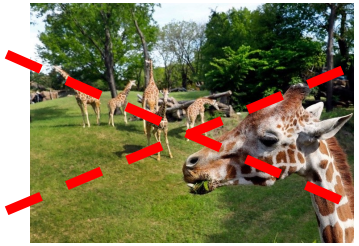
~~experienced animals and staff~~
~~safe population management~~

~~sustainability~~

~~education: nature conservation,~~
~~accountability, transparency~~ ~~– **no illusory dream world**~~

The alternatives





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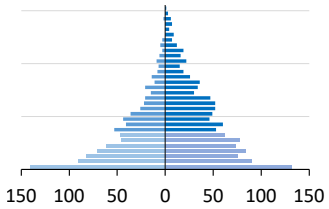
contraception consequences



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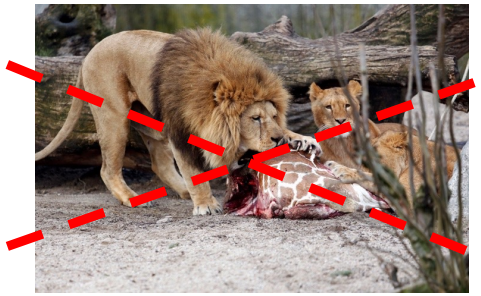
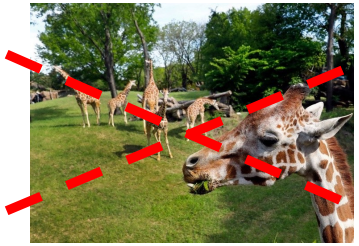
~~safe population management~~

~~sustainability~~

~~education: nature conservation,~~
~~accountability, transparency~~ ~~**no illusory dream world**~~

The alternatives





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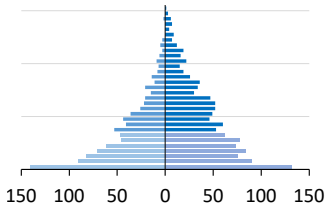
contraception consequences



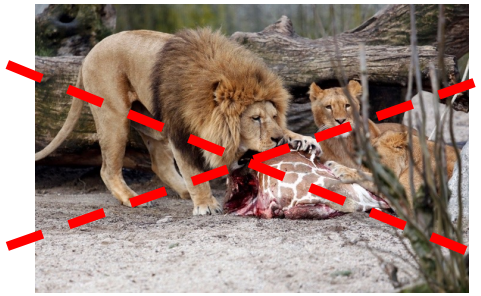
~~experienced animals and staff~~
~~safe population management~~

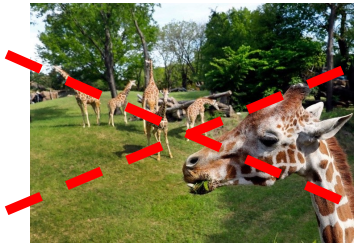
culling as per market convenience

~~sustainability~~

~~education: nature conservation, accountability, transparency – **no illusory dream world**~~

The alternatives





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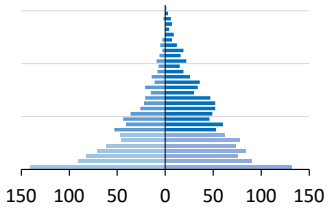
contraception consequences

culling as per market convenience



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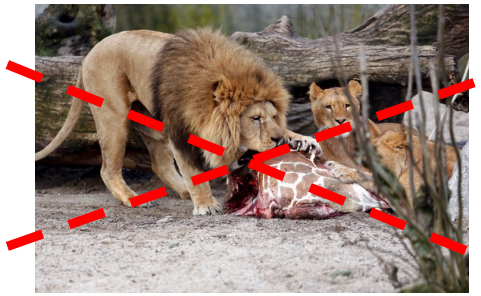
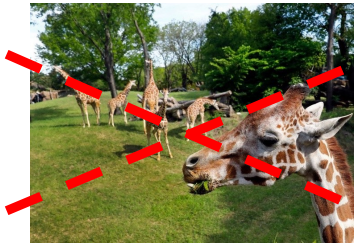
The alternatives





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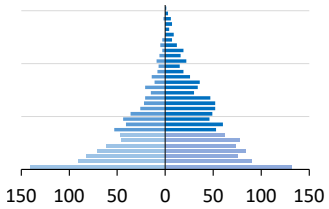
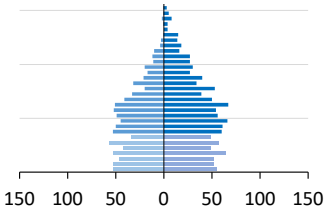




culling as per market convenience

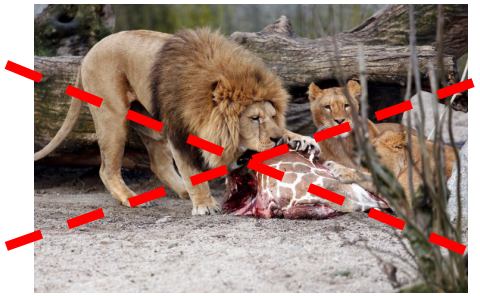
~~experienced animals and staff safe population management~~

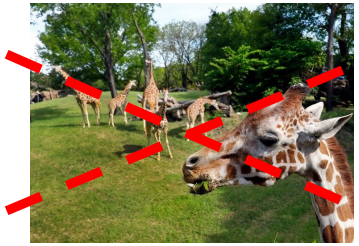
inexperienced animals and staff difficult population management

~~sustainability~~

~~education: nature conservation, accountability, transparency~~ – ***no illusory dream world***

The alternatives





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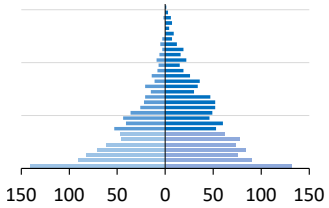
contraception consequences



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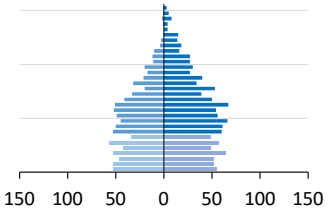


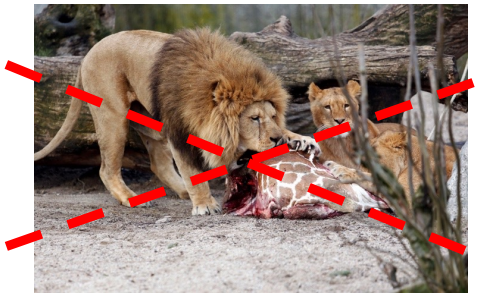
inexperienced animals and staff
difficult population management

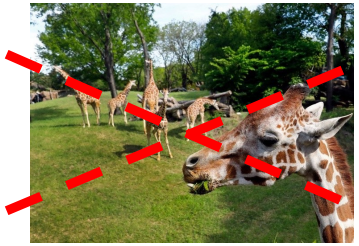
~~experienced animals and staff~~
~~safe population management~~

~~sustainability~~

~~education: nature conservation,~~
~~accountability, transparency~~ – ***~~no illusory dream world~~***

The alternatives





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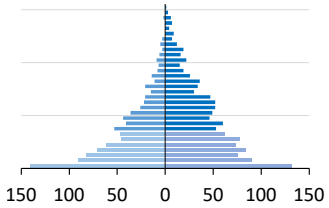
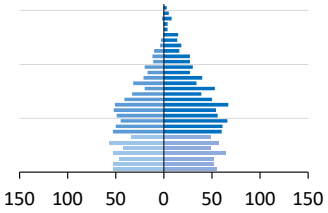


culling as per market convenience



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difficult population management

~~experienced animals and staff~~
~~safe population management~~

~~sustainability~~

less sustainable

~~education: nature conservation,~~
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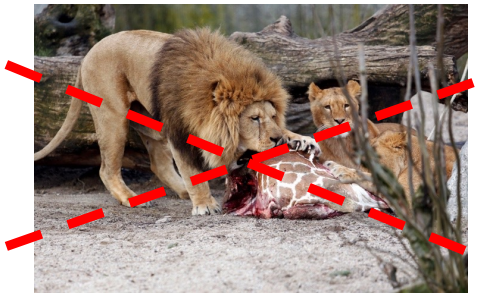
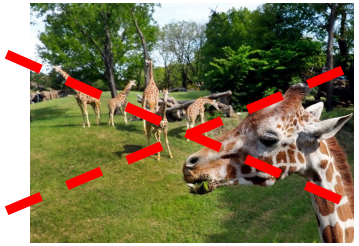
The alternatives





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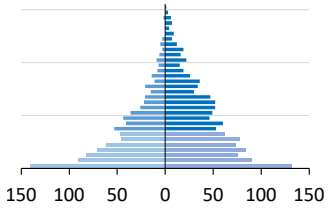

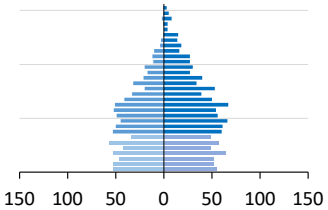

culling as per market convenience

experienced animals and staff
safe population management

inexperienced animals and staff
difficult population management

sustainability

less sustainable

education: nature conservation, accountability, transparency – ***no illusory dream world***

education: blending out unpleasant topics: death, operational constraints of conservation - ***illusory dream world (sells so well)***

«Sie wurden 38 und 31 Jahre alt»: Zoo-Tierarzt Christian Wenker zeigt, was von den beiden Shetlandponys übrig geblieben ist. Foto: Kostas Maros

Warum Tiere töten im Zolli zum Alltag gehört

Ponys geschlachtet Was passiert in der Zolli-Metzgerei? Blick in ein Gebäude des Basler Zoos, der Besuchenden verwehrt bleibt.

2021|01

manatimagazin

Magazin des Tiergartens der Stadt Nürnberg und des Vereins der Tiergartenfreunde Nürnberg e.V.

Schwerpunktthema Populationsmanagement

Töten, um zu retten?!
Invasive Arten bedrohen die Natur. Zu deren Schutz wird es sogar notwendig zu töten.

Delphine brauchen sichere Orte
Nimmt die Bedrohung der Delphine in den Ozeanen zu, bleiben noch Delphinarien.

Der Fall Wolf
Interview: Modernes Populationsmanagement aus Sicht von Prof. Sven Herzog.

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Der Fall Wolf
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TIERABGÄNGE: Todesfälle / Futtertiere

Oktober	November	Dezember	Januar	Februar	März
7,0 Meerschweinchen (Tierfutter)	1,0 Fischotter	1 Sandratte (Juv.)	1,0 Totenkopfaffe	1,2 Meerschweinchen (Tierfutter)	1 Blütenfledermaus
1,4 Zwergkaninchen (Tierfutter)	1,0 Zwergzebu (Tierfutter)	2,9 Meerschweinchen (Tierfutter)	5,0 Meerschweinchen (Tierfutter)	1 Streifenwiesel (Juv.)	1,0 Rüsselspringer
1,0 Grevyzebra (Tierfutter)	0,1 Rotschnabeltoko	1,1 Minipigs (Tierfutter)	0,1 Kalifom. Seelöwe	1,0 Prinz-Alfred-Hirsch (Tierfutter)	9 Degus (Juv.)
1,0 Schabrackentapir	0,1 Rotohrbülbül	1,0 Wisent (Tierfutter)	0,1 Pinselohrschwein	1,0 Hirschziegenantilope (Juv.)	0,1 Steppenmurmeltier
1,2 Elenantilopen (Tierfutter)	1 Veilchenorganist (Juv.)	0,1 Kaffernbüffel (Tierfutter)	1 Zwergziege (Tierfutter)	0,1 Mähnenspringer (Juv.)	1,0 Ziesel (Tierfutter)
1,0 Weißer Löffler	1 Senegalamarant (Juv.)	2,0 Hirschziegen-Antilopen (1,0 Juv.)	4 Zwergziegen (Juv.)	0,1 Humboldtpinguin	1 Streifenwiesel (Juv.)
1,0 Türkistangare	1,0 Alpenkrähe	1,0 Mähnenspringer (Tierfutter)	1 Mähnenspringer (Juv.)	1,0 Amazonasente	0,1 Kalifornischer Seelöwe
1 Helmkopfgecko	0,1 Atlasagame	1,0 Waldrapp	1,0 Chileflamingo	1 Türkistangare	1,0 Kulan
2 Atlasagamen	1 Anolis	1,0 Marmelente	1,2 Amazonasenten (Tierfutter)	1 Senegalamarant	0,1 Przewalskipferd
1 Färberfrosch	1 Rotfeuerfisch	1,2 Amazonasenten (Tierfutter)	1,0 Wüstengimpel	1,0 Panther-chamäleon	0,3 Wapitis (Tierfutter)
0,1 Kärpflingscichlide	1 Wabenschilderwels	1 Senegalamarant (Juv.)	1 Senegalamarant (Juv.)	0,1 Regenbogenfisch	0,2 Rentiere (Tierfutter)
		1,0 Dornwaldgecko	1,0 Rotohrbülbül		1,0 Rotducker (Juv.)
		1,0 Helmkopfgecko	1 Europ. Sumpfschildkröte		0,1 Kamerunschaf
		1 Oman-Dornschwanzagame	1 Gecko		0,1 Steinhuhn
		1 Hardun-Agame	0,1 Bartagame		0,1 Veilchenorganist
		1 Hundskopfschlinger	0,1 Tanganjika-Killifisch		0,1 Wüstengimpel
		0,1 Tanganjika-Killifisch	1 Pfauenaugenbarsch		2 Schmetterlingsfinken
			2 Perlmuttbarsche		2 Senegalamaranten
			1 Wandelnde Geige		3 Hardun-Agamen
			1 Rote Mangrovekrabbe		1 Rotfeuerfisch

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manatimagazin

Magazin des Tiergartens der Stadt Nürnberg und des Vereins der Tiergartenfreunde Nürnberg e.V.

Schwerpunktthema Populationsmanagement

Töten, um zu retten?!
Invasive Arten bedrohen die Natur. Zu deren Schutz wird es sogar notwendig zu töten.

Delphine brauchen sichere Orte
Nimmt die Bedrohung der Delphine in den Ozeanen zu, bleiben noch Delphinarien.

Der Fall Wolf
Interview: Modernes Populationsmanagement aus Sicht von Prof. Sven Herzog.

TIERABGÄNGE: Todesfälle / Futtertiere

Oktober	November	Dezember	Januar	Februar	März
7,0 Meerschweinchen (Tierfutter)	1,0 Fischotter	1 Sandratte (Juv.)	1,0 Totenkopfaffe	1,2 Meerschweinchen (Tierfutter)	1 Blütenfledermaus
1,4 Zwergkaninchen (Tierfutter)	1,0 Zwergzebu (Tierfutter)	2,9 Meerschweinchen (Tierfutter)	5,0 Meerschweinchen (Tierfutter)	1 Streifenwiesel (Juv.)	1,0 Rüsselspringer
1,0 Grevyzebra (Tierfutter)	0,1 Rotschnabeltoko	1,1 Minipigs (Tierfutter)	0,1 Kalifom. Seelöwe	1,0 Prinz-Alfred-Hirsch (Tierfutter)	1 Degus (Juv.)
1,0 Schabrackentapir	0,1 Rotohrbülbül	1,0 Wisent (Tierfutter)	0,1 Pinselohrschwein	1,0 Hirschziegenantilope (Juv.)	0,1 Steppenmurmeltier
1,2 Elenantilopen (Tierfutter)	1 Veilchenorganist (Juv.)	0,1 Kaffernbüffel (Tierfutter)	1 Zwergziege (Tierfutter)	0,1 Mähnenspringer (Juv.)	1,0 Ziesel (Tierfutter)
1,0 Weißer Löffler	1 Senegalamarant (Juv.)	2,0 Hirschziegenantilopen (1,0 Juv.)	4 Zwergziegen (Juv.)	0,1 Humboldtpinguin	1 Streifenwiesel (Juv.)
1,0 Türkistangare	1,0 Alpenkrähe	1,0 Mähnenspringer (Tierfutter)	1 Mähnenspringer (Juv.)	1,0 Amazonasente	0,1 Kalifornischer Seelöwe
1 Helmkopfgecko	0,1 Atlasagame	1,0 Waldrapp	1,0 Chileflamingo	1 Türkistangare	1,0 Kulan
2 Atlasagamen	1 Anolis	1,0 Marmelente	1,2 Amazonasenten (Tierfutter)	1 Senegalamarant	0,1 Przewalskipferd
1 Färberfrosch	1 Rotfeuerfisch	1,2 Amazonasenten (Tierfutter)	1,0 Wüstengimpel	1,0 Pantherchamäleon	0,3 Wapitis (Tierfutter)
0,1 Kärpflingscichlide	1 Wabenschilderwels	1 Senegalamarant (Juv.)	1 Senegalamarant (Juv.)	0,1 Regenbogenfisch	0,2 Rentiere (Tierfutter)
		1,0 Dornwaldgecko	1,0 Rotohrbülbül		1,0 Rotducker (Juv.)
		1,0 Helmkopfgecko	1 Europ. Sumpfschildkröte		0,1 Kamerunschaf
		1 Oman-Dornschwanzagame	1 Gecko		0,1 Steinhuhn
		1 Hardun-Agame	0,1 Bartagame		0,1 Veilchenorganist
		1 Hundskopfschlinger	0,1 Tanganjika-Killifisch		0,1 Wüstengimpel
		0,1 Tanganjika-Killifisch	1 Pfauenaugenbarsch		2 Schmetterlingsfinken
			2 Perlmuttbarsche		2 Senegalamaranten
			1 Wandelnde Geige		3 Hardun-Agamen
			1 Rote Mangrovekrabbe		1 Rotfeuerfisch

Marius, the Giraffe: A Comparative Informatics Case Study of Linguistic Features of the Social Media Discourse

Chris Zimmerman[1], Yuran Chen[1], Daniel Hardt[1], and Ravi Vatrapu[1, 2]

	Neutral		Positive		Negative		Total	Subjectivity
facebook.com Discussions	43254	66.8%	5930	9.2%	15606	24.1%	64790	0.50
Forum Replies	3459	85.5%	145	3.6%	441	10.9%	4045	0.17
Twitter	191378	82.4%	6842	2.9%	34065	14.7%	232285	0.21
Mainstream Media	2733	74.4%	323	8.8%	618	16.8%	3674	0.34
Others	5570	82.1%	5570	82.1%	886	13.1%	6787	1.16
Total	246394	79.1%	13571	4.4%	51616	16.6%	311581	0.26

Table 3: Subjectivity and Polarity of Online Media

A forgotten effect ?

A forgotten effect ?

27.05.14 | Bengt Holst

Marius' Zoochef ist "Kopenhagener des Jahres"

Bengt Holst ist der wohl berühmteste Zoochef der Welt. Er ließ die gesunde Giraffe Marius töten und löste einen gewaltigen Shitstorm aus. Jetzt wurde er zum "Kopenhagener des Jahres" gewählt.

Artikel empfehlen: E-Mail | Empfehlen 9 | Twittern 6 | +1 0

Foto: dpa

Die Dänen wählten den umstrittenen Zoodirektor Bengt Holst zum "Kopenhagener des Jahres"

thank you for your attention

CONFLICT OF INTERESTS

All authors are either employed by, or have major involvement with, zoological gardens.