References

Aktuell

Braun 2020

(Julian Braun,) Claudia Giesecke-Thiel, Leif Erik Sander & Andreas Thiel et al., *SARS-CoV-2-reactive T cells in healthy donors and patients with COVID-19.* nature **587** (2020), 270–274. DOI:10.1038/s41586-020-2598-9.

n587-0270-Supplement.pdf

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused the rapidly unfolding coronavirus disease 2019 (COVID-19) pandemic1,2. Clinical manifestations of COVID-19 vary, ranging from asymptomatic infection to respiratory failure. The mechanisms that determine such variable outcomes remain unresolved. Here we investigated CD4+ T cells that are reactive against the spike glycoprotein of SARS-CoV-2 in the peripheral blood of patients with COVID-19 and SARS-CoV-2-unexposed healthy donors. We detected spike-reactive CD4+ T cells not only in 83 % of patients with COVID-19 but also in 35 % of healthy donors. Spike-reactive CD4+ T cells in healthy donors were primarily active against C-terminal epitopes in the spike protein, which show a higher homology to spike glycoproteins of human endemic coronaviruses, compared with N-terminal epitopes. Spike-protein-reactive T cell lines generated from SARS-CoV-2-naive healthy donors responded similarly to the C-terminal region of the spike proteins of the human endemic coronaviruses 229E and OC43, as well as that of SARS-CoV-2. This results indicate that spike-protein cross-reactive T cells are present, which were probably generated during previous encounters with endemic coronaviruses. The effect of pre-existing SARS-CoV-2 cross-reactive T cells on clinical outcomes remains to be determined in larger cohorts. However, the presence of spike-protein cross-reactive T cells in a considerable fraction of the general population may affect the dynamics of the current pandemic, and has important implications for the design and analysis of upcoming trials investigating COVID-19 vaccines.

Julian Braun, Lucie Loyal, Marco Frentsch, Daniel Wendisch, Philipp Georg, Florian Kurth, Stefan Hippenstiel, Manuela Dingeldey, Beate Kruse, Florent Fauchere, Emre Baysal, Maike Mangold, Larissa Henze, Roland Lauster, Marcus A. Mall, Kirsten Beyer, Jobst Röhmel, Sebastian Voigt, Jürgen Schmitz, Stefan Miltenyi, Ilja Demuth, Marcel A. Müller, Andreas Hocke, Martin Witzenrath, Norbert Suttorp, Florian Kern, Ulf Reimer, Holger Wenschuh, Christian Drosten, Victor M. Corman, Claudia Giesecke-Thiel, Leif Erik Sander & Andreas Thiel

Ledford 2020

Heidi Ledford, *Why Do Covid Death Rates Appear To Be Falling?* nature **587** (2020), 190–192.

Clinicians say they're having more success in treating people, but it's not yet clear what might be curtailing mortality figures for patients with moderate to severe infections.

Lipsitch 2020

Marc Lipsitch & Natalie E. Dean, *Understanding COVID-19 vaccine efficacy.* science **370** (2020), 763–765. DOI:10.1126/science.abe5938.

Vaccine efficacy in high-risk groups and reduced viral shedding are important for protection.

Masters 2020

Nina B. Masters, Marisa C. Eisenberg, Paul L. Delamater, Matthew Kay, Matthew L. Boulton & Jon Zelner, *Fine-scale spatial clustering of measles nonvaccination that increases outbreak potential is obscured by aggregated reporting data.* PNAS **117** (2020), 28506–28514. DOI:10.1073/pnas.2011529117.

pnas117-28506-Supplement.pdf

The United States experienced historically high numbers of measles cases in 2019, despite achieving national measles vaccination rates above the World Health Organization recommendation of 95 % coverage with two doses. Since the COVID-19 pandemic began, resulting in suspension of many clinical preventive services, pediatric vaccination rates in the United States have fallen precipitously, dramatically increasing risk of measles resurgence. Previous research has shown that measles outbreaks in high-coverage contexts are driven by spatial clustering of nonvaccination, which decreases local immunity below the herd immunity threshold. However, little is known about how to best conduct surveillance and target interventions to detect and address these high-risk areas, and most vaccination data are reported at the state-level —a resolution too coarse to detect community-level clustering of nonvaccination characteristic of recent outbreaks. In this paper, we perform a series of computational experiments to assess the impact of clustered nonvaccination on outbreak potential and magnitude of bias in predicting disease risk posed by measuring vaccination rates at coarse spatial scales. We find that, when nonvaccination is locally clustered, reporting aggregate data at the state- or county-level can result in substantial underestimates of outbreak risk. The COVID-19 pandemic has shone a bright light on the weaknesses in US infectious disease surveillance and a broader gap in our understanding of how to best use detailed spatial data to interrupt and control infectious disease transmission. Our research clearly outlines that finer-scale vaccination data should be collected to prevent a return to endemic measles transmission in the United States.

Significance: The United States witnessed large, persistent measles outbreaks in 2019, nearly losing its elimination status, despite achieving national measles vaccination coverage above the World Health Organization recommendation of 95 %. Previous research showed that measles outbreaks in high-coverage contexts are driven by spatially clustered nonvaccination, locally depressing immunity levels. We perform a series of computational experiments to assess the impact of clustering of nonvaccination on outbreak potential and how disease risk predictions might be biased by measuring vaccination rates at coarse spatial scales. When nonvaccination is locally clustered, reporting aggregated data can result in substantial underestimates of outbreak risk. This research illustrates that finer-scale vaccination data should be collected to prevent a return to endemic measles transmission in the United States.

Polyakova 2020

Maria Polyakova, Geoffrey Kocks, Victoria Udalova & Amy Finkelstein, *Initial economic damage from the COVID-19 pandemic in the United States is more widespread across ages and geograph-*

ies than initial mortality impacts. PNAS **117** (2020), 27934–27939. DOI:10.1073/pnas.2014279117.

pnas117-27934-Supplement.pdf

The economic and mortality impacts of the COVID-19 pandemic have been widely discussed, but there is limited evidence on their relationship across demographic and geographic groups. We use publicly available monthly data from January 2011 through April 2020 on all-cause death counts from the Centers for Disease Control and Prevention and employment from the Current Population Survey to estimate excess all-cause mortality and employment displacement in April 2020 in the United States. We report results nationally and separately by state and by age group. Nationally, excess all-cause mortality was 2.4 per 10,000 individuals (about 30 % higher than reported COVID deaths in April) and employment displacement was 9.9 per 100 individuals. Across age groups 25 y and older, excess mortality was negatively correlated with economic damage; excess mortality was largest among the oldest (individuals 85 y and over: 39.0 per 10,000), while employment displacement was largest among the youngest (individuals 25 to 44 y: 11.6 per 100 individuals). Across states, employment displacement was positively correlated with excess mortality (correlation = 0.29). However, mortality was highly concentrated geographically, with the top two states (New York and New Jersey) each experiencing over 10 excess deaths per 10,000 and accounting for about half of national excess mortality. By contrast, employment displacement was more geographically spread, with the states with the largest point estimates (Nevada and Michigan) each experiencing over 16 percentage points employment displacement but accounting for only 7 % of the national displacement. These results suggest that policy responses may differentially affect generations and geographies.

Significance: A full picture of the COVID-19 pandemic requires information on how its impact on lives and on livelihoods relates across different groups. We therefore estimate excess all-cause mortality and employment displacement in April 2020 nationally and separately by state and by age group. Initial economic damages from the pandemic are more widespread across groups than deaths, which were primarily concentrated in a few states and among the oldest old. While the two states with the largest mortality increase account for about half of national excess mortality, the two most economically affected states account for only 7 % of national economic damages. These findings suggest that policy responses to contain the pandemic involve trade-offs across different demographic and geographic groups.

Saad-Roy 2020

Chadi M. Saad-Roy et al., *Immune life history, vaccination, and the dynamics of SARS-CoV-2 over the next 5 years.* science **370** (2020), 811–818. DOI:10.1126/science.abd7343.

s370-0811-Supplement.pdf

The future trajectory of the coronavirus disease 2019 (COVID-19) pandemic hinges on the dynamics of adaptive immunity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); however, salient features of the immune response elicited by natural infection or vaccination are still uncertain. We use simple epidemiological models to explore estimates for the magnitude and timing of future COVID-19 cases, given different assumptions regarding the protective efficacy and duration of the adaptive immune response to SARS-CoV-2, as well as its interaction with vaccines and nonpharmaceutical interventions. We find that variations in the immune response to primary SARS-CoV-2 infections and a

potential vaccine can lead to markedly different immune landscapes and burdens of critically severe cases, ranging from sustained epidemics to near elimination. Our findings illustrate likely complexities in future COVID-19 dynamics and highlight the importance of immunological characterization beyond the measurement of active infections for adequately projecting the immune landscape generated by SARS-CoV-2 infections.

Chadi M. Saad-Roy, Caroline E. Wagner, Rachel E. Baker, Sinead E. Morris, Jeremy Farrar, Andrea L. Graham, Simon A. Levin, Michael J. Mina, C. Jessica E. Metcalf & Bryan T. Grenfell

Biologie

G<small>UELLIL</small> 2020

Meriam Guellil, Oliver Kersten, Amine Namouchi, N. C. Stenseth & Barbara Bramanti et al., *A genomic and historical synthesis of plague in 18th century Eurasia.* PNAS **117** (2020), 28328–28335.

pnas117-28328-Supplement.pdf

Plague continued to afflict Europe for more than five centuries after the Black Death. Yet, by the 17th century, the dynamics of plague had changed, leading to its slow decline in Western Europe over the subsequent 200 y, a period for which only one genome was previously available. Using a multidisciplinary approach, combining genomic and historical data, we assembled Y. pestis genomes from nine individuals covering four Eurasian sites and placed them into an historical context within the established phylogeny. CHE1 (Chechnya, Russia, 18th century) is now the latest Second Plague Pandemic genome and the first non-European sample in the post-Black Death lineage. Its placement in the phylogeny and our synthesis point toward the existence of an extra-European reservoir feeding plague into Western Europe in multiple waves. By considering socioeconomic, ecological, and climatic factors we highlight the importance of a noneurocentric approach for the discussion on Second Plague Pandemic dynamics in Europe.

Keywords: Yersinia pestis | ancient DNA | aDNA | pathogen | plague

Meriam Guellil, Oliver Kersten, Amine Namouchi, Stefania Luciani, Isolina Marota, Caroline A. Arcini, Elisabeth Iregren, Robert A. Lindemann, Gunnar Warfvinge, Lela Bakanidze, Lia Bitadze, Mauro Rubini, Paola Zaio, Monica Zaio, Damiano Neri, N. C. Stenseth & Barbara Bramanti

Significance: The spread and evolution of plague have been under debate in the past few years. However, very little is known of the dynamics of the plague pathogen, Yersinia pestis, during the last phase of the Second Plague Pandemic in Europe (18th and 19th century). We present nine ancient Y. pestis genomes from the Second Plague Pandemic. CHE1 is the first Second Plague Pandemic genome from the Caucasus region, an area that houses plague wildlife reservoirs to this day, making it a key strain to help elucidate the origin of Medieval and Early Modern plague. Our study documents the importance of a noneurocentric approach to historical plague dynamics and proposes an origin of plague introductions outside of Europe.

Keramik

C<small>HRISTIANSEN</small> 2020

Thomas Christiansen, Marine Cotte & Sine Larsen et al., *Insights into the composition of ancient Egyptian red and black inks on papyri*

achieved by synchrotron-based microanalyses. PNAS **117** (2020), 27825–27835.

pnas117-27825-Supplement.pdf

A hitherto unknown composition is highlighted in the red and black inks preserved on ancient Egyptian papyri from the Roman period (circa 100 to 200 CE). Synchrotron-based macro–X-ray fluorescence (XRF) mapping brings to light the presence of iron (Fe) and lead (Pb) compounds in the majority of the red inks inscribed on 12 papyrus fragments from the Tebtunis temple library. The iron-based compounds in the inks can be assigned to ocher, notably due to the colocalization of Fe with aluminum, and the detection of hematite (Fe_2O_3) by micro–X-ray diffraction. Using the same techniques together with micro-Fourier transform infrared spectroscopy, Pb is shown to be associated with fatty acid phosphate, sulfate, chloride, and carboxylate ions. Moreover, microXRF maps reveal a peculiar distribution and colocalization of Pb, phosphorus (P), and sulfur (S), which are present at the micrometric scale resembling diffused "coffee rings" surrounding the ocher particles imbedded in the red letters, and at the submicrometric scale concentrated in the papyrus cell walls. A similar Pb, P, and S composition was found in three black inks, suggesting that the same lead components were employed in the manufacture of carbon-based inks. Bearing in mind that pigments such as red lead (Pb_3O_4) and lead white (hydrocerussite [$Pb_3(CO_3)_2(OH)_2$] and/or cerussite [$PbCO_3$]) were not detected, the results presented here suggest that the lead compound in the ink was used as a drier rather than as a pigment. Accordingly, the study calls for a reassessment of the composition of lead-based components in ancient Mediterranean pigments.

Keywords: inks | ancient Egypt | papyri | synchrotron-based | microanalyses

Thomas Christiansen, Marine Cotte, Wout de Nolf, Elouan Mouro, Juan Reyes-Herrera, Steven de Meyer, Frederik Vanmeert, Nati Salvadó, Victor Gonzalez, Poul Erik Lindelof, Kell Mortensen, Kim Ryholt, Koen Janssens & Sine Larsen

Significance: Ink, invented in ancient Egypt circa 5,000 y ago, is the established and time-honored medium wherewith humankind commits words to writing. A comprehensive synchrotronbased microanalysis of a considerable corpus of ancient Egyptian papyri from the Roman period, inscribed with red and black inks, reveal a hitherto undetected complex composition of inks. Highlighted by the presence of iron, the red color can be attributed to the use of ocher. Unexpectedly, lead is regularly present in both the red and black inks and is associated to phosphate, sulfate, chloride, and carboxylate ions. The analysis shows that lead was probably used as a drier rather than as a pigment, similar to its usage in 15th century Europe during the development of oil paintings.

Klima

Chen 2020

Ningbo Chen, Lele Ren, Linyao Du, Victoria E. Mullin, Chuzhao Lei, Fahu Chen, Guanghui Dong & Xiaoming Zhang et al., *Ancient genomes reveal tropical bovid species in the Tibetan Plateau contributed to the prevalence of hunting game until the late Neolithic.* PNAS **117** (2020), 28150–28159.

pnas117-28150-Supplement.pdf

Local wild bovids have been determined to be important prey on the northeastern Tibetan Plateau (NETP), where hunting game was a major subsistence strategy until the late Neolithic, when farming lifestyles dominated in the neighboring Loess Plateau. However, the species affiliation and population ecology of these

prehistoric wild bovids in the prehistoric NETP remain unknown. Ancient DNA (aDNA) analysis is highly informative in decoding this puzzle. Here, we applied aDNA analysis to fragmented bovid and rhinoceros specimens dating ≈5,200 y B.P. from the Neolithic site of Shannashuzha located in the marginal area of the NETP. Utilizing both whole genomes and mitochondrial DNA, our results demonstrate that the range of the present-day tropical gaur (Bos gaurus) extended as far north as the margins of the NETP during the late Neolithic from ≈29°N to ≈34°N. Furthermore, comparative analysis with zooarchaeological and paleoclimatic evidence indicated that a high summer temperature in the late Neolithic might have facilitated the northward expansion of tropical animals (at least gaur and Sumatran-like rhinoceros) to the NETP. This enriched the diversity of wildlife, thus providing abundant hunting resources for humans and facilitating the exploration of the Tibetan Plateau as one of the last habitats for hunting game in East Asia.

Ningbo Chen, Lele Ren, Linyao Du, Jiawen Hou, Victoria E. Mullin, Duo Wu, Xueye Zhao, Chunmei Li, Jiahui Huang, Xuebin Qi, Marco Rosario Capodiferro, Alessandro Achilli, Chuzhao Lei, Fahu Chen, Bing Su, Guanghui Dong & Xiaoming Zhang

Significance: We undertook an ancient genomic DNA investigation of large animal remains dated ≈5,200 y B.P. from the Tibetan Plateau. We provide compelling evidence that the present-day lowlatitude tropical inhabitants Bos gaurus and Dicerorhinus sumatrensis once roamed as far north as the margin of the northeastern Tibetan Plateau (NETP) during the late Neolithic, pushing the historical gaur distribution from ≈29°N to ≈34°N. Further multidisciplinary exploration indicates that a high summer temperature in the late Neolithic might have facilitated the northward expansion of these tropical animals to the NETP, which enriched the biodiversity of wildlife and contributed to the exploration of the Tibetan Plateau as one of the last habitats for hunting game in East Asia.

Kultur

Gronenborn 2020

Detlef Gronenborn & Rainer Schreg, *Archäologie und Seuchen*, *Haben Seuchen einen Einfluss auf den Verlauf der Geschichte?* Archäologie in Deutschland **2020**, iv, 48–49.

Aus aktuellem Anlass berichten die Autoren, was archäologische Forschungen zu dieser Frage beitragen können.

Der Blick in die Vergangenheit lehrt, dass es nie die Seuchen allein waren, die einen Zusammenbruch ausgelost haben, sie traten immer in Kombination mit anderen Faktoren auf und haben diese in ihrer Wirkung verstarkt.

Metallzeiten

Meller 2019

Harald Meller, *Fürsten, Goldwaffen und Armeen – Überlegungen zum Goldfund von Dieskau und dessen möglicher Herkunft aus dem frühbronzezeitlichen Großgrabhügel Bornhöck bei Dieskau, Saalekreis.* In: Harald Meller & François Bertemes (Hrsg.), *Der Aufbruch zu neuen Horizonten – Neue Sichtweisen zur europäischen*

Frühbronzezeit, Abschlusstagung der Forschergruppe FOR550 vom 26. bis 29. November 2010 in Halle (Saale). Tagungen des Landesmuseums für Vorgeschichte Halle 19 (Halle 2019), 101–111.

The famous Early Bronze Age gold find from Dieskau, Saalekreis district, in Central Germany still consists of three arm rings, a small ring, and a flanged axe, while eight other unknown objects are lost. The find was discovered in 1874, only 3 km from a very large princely burial mound called "Bornhöck", which was removed mainly in the second half of the 19th century AD. In this paper it is argued that the gold find was probably at first found during the removal of the "Bornhöck" and then attributed to its later findspot. In any case, there is a connection to the princely graves of the Únìtice Culture. Based on this it is therefore possible, that the prince of Dieskau was the most powerful among these princes.

Der berühmte frühbronzezeitliche Goldfund von Dieskau, Saalekreis, in Mitteldeutschland umfasst heute nur noch drei Armringe, ein kleines Ringlein und ein Randleistenbeil, während acht weitere unbekannte Objekte verloren sind. Der Fund wurde im Jahre 1874 in nur 3 km Entfernung vom gewaltigen Fürstengrabhügel Bornhöck entdeckt, der größtenteils in der zweiten Hälfte des 19. Jhs. n. Chr. abgetragen wurde. In diesem Beitrag wird argumentiert, dass der Goldfund möglicherweise erstmals während der Abtragung des Bornhöck gefunden und dann an seinem späteren Fundort niedergelegt wurde. Auf jeden Fall besteht eine Verbindung zu den Fürstengräbern der Aunjetitzer Kultur. Daraus lässt sich ableiten, dass der Fürst von Dieskau wahrscheinlich der mächtigste dieser Fürsten war.

Meller 2019

Harald Meller, *Zur Farbigkeit der Waffen in der mitteldeutschen Aunjetitzer Kultur und ihrer Interpretation als militärisches Ordnungssystem.* In: Harald Meller & François Bertemes (Hrsg.), *Der Aufbruch zu neuen Horizonten – Neue Sichtweisen zur europäischen Frühbronzezeit, Abschlusstagung der Forschergruppe FOR550 vom 26. bis 29. November 2010 in Halle (Saale).* Tagungen des Landesmuseums für Vorgeschichte Halle 19 (Halle 2019), 145–158.

The hierarchical society of the Circum-Harz Group of the Únìtice Culture was distributed in different territories and was dominated by princes who commanded armies. These military units and their leaders are represented by the numerical proportion of the rich hoards, which are thus reflecting social realities. Accordingly, since the richest hoards originate from here, the Dieskau territory had the largest armies. Furthermore, with the Bornhöck the largest known princely burial has been discovered there. The gold find from Dieskau, which contained among others a gold axe, is thought to originally have been located in this burial mound. In addition to this, it becomes apparent that the numerous axes from the hoards, i.e. the weapons of the common soldiers, are predominantly made of copper, while the halberds, daggers, and ribbed double axes, i.e. the weapons of the leaders, are made of differently coloured copper alloys. By contrast, the few axes from burials of leaders or from the princely graves at Leubingen and Helmsdorf are made of gold-coloured tin bronze. Actually, all grave goods from the princely tombs are especially highly tin-alloyed. Besides modified casting and mechanical properties, the colour of the weapons itself most certainly also played a role in reflecting the bearer's social status. Taking into account the ancient colouring, we are also able to distinguish the equipment of different individuals within the hoards, which will be explained by taking the example of the hoard at Dieskau II.

Die hierarchische Gesellschaft der Circumharzer Gruppe der Aunjetitzer Kultur war in verschiedene Territorien aufgeteilt und wurde von Fürsten beherrscht, die über Armeen geboten. Diese militärischen Einheiten und ihre Anführer geben sich in den Zahlenverhältnissen der reichen Hortfunde zu erkennen, die somit eine soziale Realität widerspiegeln. Demnach verfügte das Territorium Dieskau über die größten Armeen, da von hier die reichsten Horte vorliegen. Außerdem wurde mit dem Bornhöck auch das größte bekannte Fürstengrab gefunden und in dem wahrscheinlich ursprünglich aus diesem Grabhügel stammenden Goldfund aus Dieskau unter anderem ein goldenes Beil. Zusätzlich zeigt sich, dass die zahlreichen Beile in den Horten, also die Waffen der einfachen Kämpfer, vorwiegend aus Kupfer bestehen, während Stabdolche, Dolche und gerippte Doppeläxte, d. h. die Waffen der Anführer, aus andersfarbigen Kupferlegierungen bestehen. Hingegen sind die wenigen Beile aus Gräbern, bei denen es sich um die Bestattungen von Anführern, aber auch um die Fürstengräber von Leubingen und Helmsdorf handelt, aus goldfarbener Zinnbronze gefertigt. Dabei sind sämtliche Beigaben der Fürstengräber besonders hoch mit Zinn legiert. Neben den veränderten gusstechnischen und mechanischen Eigenschaften spielte sicher die Farbigkeit der Waffen eine Rolle, die somit auch Ausdruck des sozialen Status war. Die Berücksichtigung der antiken Farbigkeit ermöglicht es außerdem, die Ausstattungen verschiedener Personen in den Horten zu differenzieren, wie am Beispiel des Hortes von Dieskau II gezeigt wird.

Wunderlich 2019

Christian-Heinrich Wunderlich, Jan-Heinrich Bunnefeld & Harald Meller, *Buntmetall. Farbigkeit und ästhetische Eigenschaften von Legierungen der Aunjetitzer Kultur.* In: Harald Meller & François Bertemes (Hrsg.), *Der Aufbruch zu neuen Horizonten – Neue Sichtweisen zur europäischen Frühbronzezeit, Abschlusstagung der Forschergruppe FOR550 vom 26. bis 29. November 2010 in Halle (Saale).* Tagungen des Landesmuseums für Vorgeschichte Halle 19 (Halle 2019), 159–181.

Given the various copper alloy weapons from hoards and burials of the central German Únìtice Culture, the question arises as to what extent the alloys relate to the high social stratification and if they additionally distinguish the weapons as status symbols, e. g. due to the resulting various colours. In order to enable an objective evaluation of the colour and surface glossiness of alloys, 34 archaeological alloy objects and 30 model alloys were recast and the colour value of a total of 63 alloys was examined using a spectrophotometer. It turned out that tin alone changes the colour decisively while other alloy partners merely lighten or rather "grey" the colour. Depending on the further treatment and the resulting structure, the colour of copper-tin alloys can also vary. Among the artefacts, three groups can be distinguished by means of visual factors and colour measurement. Between those, however, numerous other objects can be located: axes with bright reddish copper alloys, golden real tin bronze, which especially appears in rich burial finds, as well as silvercoloured but brittle alloys with high amounts of arsenic, antimony, and nickel from which only ribbed "double axes" were made. It is very likely, that the colour of the metal was used as an (additional) means of distinction, at least in the case of the latter two groups. On the contrary, for the first group and for objects in between the groups, there exists no specific indication of a particular colour and its use.

Angesichts der unterschiedlichen Kupferlegierungen der Waffen in den Hort- und Grabfunden der mitteldeutschen Aunjetitzer Kultur stellt sich die Frage, inwiefern

sie mit der hohen sozialen Stratifizierung zusammenhängen und diese z. B. durch die unterschiedliche Farbigkeit der Waffen als Statussymbole nochmals verdeutlichen. Um eine objektive Bewertung der Farbigkeit und des Glanzverhaltens der Legierungen zu ermöglichen, wurden 34 Legierungen archäologischer Objekte und 30 Modelllegierungen nachgegossen und die Farbwerte von insgesamt 63 Legierungen mittels eines Spektrophotometers untersucht. Dabei stellte sich heraus, dass allein Zinn den Farbton entscheidend verändert, während andere Legierungspartner die Farbe lediglich aufhellen bzw. "vergrauen". Je nach weiterer Behandlung und ihrer daraus resultierenden Gefügestruktur kann die Farbe bei Kupfer-Zinn-Legierungen zudem variieren. Unter den Artefakten sind hinsichtlich der Farbe visuell und mithilfe der Farbmessungen drei Gruppen zu unterscheiden, zwischen denen allerdings zahlreiche weitere Objekte zu verorten sind: Beile mit hellrötlichen Kupferlegierungen, goldfarbene echte Zinnbronzen, die vor allem in reichen Grabfunden auftreten, sowie silberfarbene, aber spröde Legierungen mit hohen Gehalten von Arsen, Antimon und Nickel, aus denen nur gerippte "Doppeläxte" hergestellt wurden. Sehr wahrscheinlich wurde die Farbigkeit des Metalls zumindest bei den beiden letztgenannten Gruppen als (zusätzliches) Distinktionsmittel eingesetzt, während sich bei der ersten Gruppe und für die zwischen diesen Gruppen liegenden Objekte kein konkreter Hinweis auf eine besondere Farbigkeit und deren Ausnutzung ergibt.