Supplementary Information

Rapid screening for specific glycosylation and pathogen interactions on a 78 species avian egg white glycoprotein microarray

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Figure S6. Phylogenic tree of birds used in this study according to DNA-DNA hybridisation¹ (adapted from Suzuki, *et al.*, 2004^2).

Table S1. Species of origin of avian EW microarray. Birds grouped by systematic order indicated by an assigned capital letter (A-P).

Table S2. Two printing panels of EW microarray. The samples are listed based on their printing location.

Table S3 (**.xls file**). Data for lectin and toxin interactions with EW microarray. Normalised fluorescence intensities from incubations of all lectins used in this study, together with their respective inhibitions (**Table 1**) and two toxins with the EW microarray (78 EWs and 17 overlapping standards). Standard deviation for all replicates included. Percentage inhibition was calculated based on the mean values. Coefficient of variation expressed as a percentage (%CV) for all interactions and inhibitions was included.

RESULTS AND DISCUSSION

Optimisation of EW solubilisation

Prior to electrophoresis, solubilisation optimisation was carried out on lyophilised pigeon EW (PEW), gull EW (GEW), CEW, DEW and QEW samples to ensure maximum protein retention. Solubilisation in PBS resulted in a proportion of insoluble aggregates which were removed by centrifugation and filtration. Subsequent delipidisation and acetone precipitation resulted in significant loss of protein, e.g. the protein content of GEW and PEW decreased to 20% and 24% of the original PBS solubilised content, respectively, after delipidisation and 9% and 18%, respectively, after acetone precipitation (data not shown). Fresh CEW is approximately 12% protein by weight with only approximately 0.2% lipid and 0.7% free carbohydrate content,³ and centrifugation and filtration was found to be sufficient prior to SDS-PAGE analysis and microarray printing.

Optimisation of EW microarray printing

The Nexterion® Slide H microarray slides were selected for optimal background and chemical compatibility as previously described.^{4,5} PEW, GEW, CEW, DEW and QEW samples were used to optimise microarray printing and were printed at 0.1 to 0.6 mg/ml, either in PBS or PBS with 0.05% Tween 20 (PBS-T) using a piezoelectric dispenser capillary (PDC) with a hydrophobic coating. The printed slides were incubated with a panel of selected TRITC-labelled lectins (**Table 1**) to monitor the printed feature quality. The lectins were selected based on the glycosylation motifs expected to be present in the EW samples.^{2,6} Not all interactions were inhibitable (Supplementary **Table S3** and **Figure S2**). The average interarray coefficient of variance (%CV) for all lectins was ~16% (range 5% to 45%) for the 78 EWs and ~16% (range <1% to 40%) for the glycoprotein standards (Supplementary **Table S3**). These ranges were lower than expected based on the high viscosity of the samples and %CV reported for other protein-based microarrays.^{4,7}



Figure S1. Optimisation of EWs for printing. A) Protein profiles of selected EWs. Samples of five EWs (1 μ g per lane, dissolved in PBS pH 7.4) were separated on 10% SDS-PAGE /MOPS and silver stained; commercial (Sigma) purified chicken standards (0.5 μ g per lane): ovotransferin (OVT), ovomucoid (OVM), ovalbumin (OVA) and lysosyme (LYZ) were used. B) Schematic of printing layout for the PEW sample printed in gradually increasing concentrations: 0.1-0.6 mg/mL in PBS pH 7.4 (left half) or 0.05% PBS-T (right half). Each sample was printed six times, resulting in six replicate spots. The example illustrates the binding of PEW with PHA-E incubated at a concentration of 0.7 μ g/ml. An extraction grid was loaded on top of the imaged spots to indicate the challenges of data extraction, including proper feature fitting. C) Histogram illustrating the mean fluorescence intensity from part B to compare the variability within six replicates. Error bars indicate the standard deviation for the fluorescence intensity of six replicate features for each sample.

Five lectins from the initial library (VVA-B4, PNA, VRA, UEA-I and Jacalin) demonstrated very low binding (data not shown) and did not reach the threshold for inhibition (a minimum of 25% reduction of binding intensity upon co-incubation with appropriate hapten on average for all printed samples). Thus, these five lectins were excluded from the subsequent glycosylation analysis which included the remaining 14 lectins (**Table 1**).

Uniform feature morphology is required for reliable microarray data extraction and the addition of detergent resulted in round features with an average size of 150 μ m (Supplementary **Figure S1B**). A concentration-dependent increase in lectin binding was observed up to 0.6 mg/ml, the maximum concentration possible to print for the majority of EWs due to their limited availability (Supplementary **Figure S1C**). Standard glycoproteins were included to monitor lectin performance and were printed at 0.5 mg/ml with 0.01% Tween 20 with the exception of OVA and OVM, which were optimally printed with 0.015% Tween 20 (Supplementary **Table S2**).

Performance of lectins with printed glycoprotein standards

Glycoprotein standards printed on the EW microarray (Supplementary **Figure S2**) demonstrated the expected associations with lectins including binding of the mannose- (Man-) specific lectins NPA and GNA to yeast invertase, which has high- and oligo-mannose type *N*-linked oligosaccharides.⁷ The absence of MAA binding to asialofetuin (ASF) confirmed the loss of sialic acid when compared to fetuin and MAA also bound to the serum globulins human α -1-antitrypsin (A1AT), human α -1-acid glycoprotein (AGP) and bovine transferrin, as previously reported).⁴



Figure S2. Analysis of glycoproteins (other than chicken EW glycoproteins) included as controls in the two panels of EW microarray. A) Lectin profiles, B) inhibition. Lectin binding profiles of fifteen selected lectins recognised as specific interaction and cholera toxin (Ctx-B), together with their concentrations listed in brackets. The lectin AIA (Jacalin) had carbohydrate inhibitable binding for the glycoprotein standards (non-EW) included on the microarray as controls (included in this figure in the carbohydrate-mediated lectin binding library). The fluorescence intensity values shown are the average of the normalised data from three replicates, with error bars indicating one standard deviation. Error bars are one standard deviation for the of all replicates (Supplementary Table **S3**). mean

Additional tables

Common name	on name Genus and species Abbreviation Order co		Order code	Order	Family
Magpie goose	Anseranas semipolmata	MGP	Α	Anseriformes	Anseranatidae
Plumed whistling-duck	Dendrocygna eytoni	PWD	Α	Anseriformes	Dendrocygnidae
Redhead	Aythya americana	RED	Α	Anseriformes	Anatidae
Ringed teal	Callonetta (Anas) leucophrys	RIT	Α	Anseriformes	Anatidae
Barrow's goldeneye	Bucephala islandica	BGE	Α	Anseriformes	Anatidae
Eurasian widgeon	Anas penelope	EAW	Α	Anseriformes	Anatidae
Domesticated duck	Anas platyrhynchos	DEW	Α	Anseriformes	Anatidae
Wood duck	Aix sponsa	WOD	Α	Anseriformes	Anatidae
Black swan	Cygnus atratus	SWN	Α	Anseriformes	Anatidae
Canada goose	Branta canadensis	CNG	Α	Anseriformes	Anatidae
Southern screamer	Chauna torquata	SOS	Α	Anseriformes	Anhimidae
Gull	Larus argentatus	GEW	В	Ciconiiformes	Laridae
Herring gull	Larus argentatus	HGL	В	Ciconiiformes	Laridae
Black-winged stilt	Himantopus himantopus	BWS	В	Ciconiiformes	Charadriidae
Spur-winged lapwing	Vanellus spinosus	SPL	В	Ciconiiformes	Charadriidae
Adelie penguin	Pygoscelis adeliae	APE	В	Ciconiiformes	Spheniscidae
Humboldt penguin	Spheniscus humboldti	HPE	В	Ciconiiformes	Spheniscidae
Macaroni penguin	Eudyptes chrysolophus	MPE	В	Ciconiiformes	Spheniscidae
Brahminy kite	Haliastur indus	BRK	В	Ciconiiformes	Accipitridae
Crested caracara	Polyborus plancus	CRC	В	Ciconiiformes	Falconidae
Chimango caracara	Milvago chimango	CMC	В	Ciconiiformes	Falconidae
Great-crestec grebe	Podiceps cristatus	GCG	В	Ciconiiformes	Podicipedidae
Great cormorant	Phalacrocorax carbo	GCM	В	Ciconiiformes	Phalacrocoracidae
Greater flamingo	Phoenicopterus ruber	GFN	В	Ciconiiformes	Phoenicopteridae

Table S1. Species of origin of avian EW microarray. Birds grouped by systematic order indicated by an assigned capital letter (A-P).

Mascarene reef-egret	Egretta dimorpha	MRE	В	Ciconiiformes	Ardeidae
Little blue heron	Egretta caerulae	LBH	В	Ciconiiformes	Ardeidae
Domestic pigeon	Columba liviadomestica	PEW	С	Columbiformes	Columbidae
Common crowned pigeon	Goura cristata	CPI	С	Columbiformes	Columbidae
Mourning dove	Zenaida macroura	MOD	С	Columbiformes	Columbidae
Rock dove	Columba livia	RKD	С	Columbiformes	Columbidae
Laughing kookaburra	Dacelo novaeguineae	LGK	D	Coraciiformes	Halcyonidae
Malle fowl	Leipoa ocellata	MLF	Ε	Craciformes	Megapodiidae
Razor-billed curassow	Crax mitu	RCU	Ε	Craciformes	Cracidae
Coral-billedground-cuckoo	Carpococcyx renauldi	CGC	F	Cuculiformes	Cuculidae
Roadrunner	Geococcyx californianus	RDR	F	Cuculiformes	Neomorphidae
Domesticated chicken	Gallus gallus domesticus	CEW	G	Galliformes	Phasianidae
Wild turkey	Meleagris gallopavo	TKY	G	Galliformes	Phasianidae
Coqui francolin	Francolinus coqui	COF	G	Galliformes	Phasianidae
Scaled (blue) quail	Callipepla squamata pallida	SCQ	G	Galliformes	Odontophoridae
Japanese quail	Coturnix japonica	QEW	G	Galliformes	Phasianidae
Mountain quail	Oreortyx pictus	MTQ	G	Galliformes	Odontophoridae
Congo peafowl	Afropavo congensis	CPF	G	Galliformes	Phasianidae
Cabot's tragopan	Tragopan caboti	CTP	G	Galliformes	Phasianidae
White-tailed ptarmigan	Lagopus leucurus	TTR	G	Galliformes	Phasianidae
Malay great argus	Argusianus argus	MGA	G	Galliformes	Phasianidae
Ruffed grouse	Bonasa umbellus	RFG	G	Galliformes	Phasianidae
Satyr tragopan	Tragopan Satyra	STP	G	Galliformes	Phasianidae
Silver pheasant	Lophura nycthermera	SVP	G	Galliformes	Phasianidae
Helmet guineafowl	Numida Meleagris	GUI	G	Galliformes	Numididae
Vulturine guineafowl	Acryllium vulturinum	VGU	G	Galliformes	Numididae
Black-legged seriema	Chunga burmeisteri	BLS	Н	Gruiformes	Cariamidae
Japanese crane	Grus japonensis	JPC	Н	Gruiformes	Gruidae

White-naped crane	Grus vipio	WNC	\mathbf{H}	Gruiformes	Gruidae
White-cheeked turaco	Turaco leucotis	WCT	Ι	Musophagiformes	Musophagidae
Albert's lyrebird	Menura alberti	ABL	J	Passeriformes	Menuridae
Blue-shouldered robin-chat	Cossypha cyanocampter	BRC	J	Passeriformes	Muscicapidae
Crimson finch	Neochmia phaeton	CFI	J	Passeriformes	Passeridae
House sparrow	Passer domesticus	HOS	J	Passeriformes	Passeridae
Common starling	Sturnus vulgaris	CNS	J	Passeriformes	Sturnidae
Masked woodswallow	Artamus personatus	MWS	J	Passeriformes	Corvidae
American robin	Turdus migratorius	ROB	J	Passeriformes	Muscicapidae
Common flicker	Colaptes auratus	CFL	K	Piciformes	Picidae
Budgerigar	Melopsittacus undulatus	BGR	L	Psittaciformes	Psittacidae
Grey parrot	Psittacus erithacus	GPT	\mathbf{L}	Psittaciformes	Psittacidae
Turquois-fronted parrot	Amazona aestiva	TPT	\mathbf{L}	Psittaciformes	Psittacidae
White-capped parrot	Pionus senilis	WPT	\mathbf{L}	Psittaciformes	Psittacidae
Yellow-headed parrot	Amazoa ochrocephala	YPT	L	Psittaciformes	Psittacidae
Barn owl	Tyto alba	BOW	Μ	Strigiformes	Tytonidae
Snowy owl	Nyctea scandiaca	SNO	\mathbf{M}	Strigiformes	Strigidae
Australian cassowary	Casuarius casuarius	ASC	Ν	Struthioniformes	Casuariidae
Emu	Dromaius novaehollandiae	EMU	Ν	Struthioniformes	Casuariidae
Ostrich	Struthio camelus	OST	Ν	Struthioniformes	Struthionidae
Greater rhea	Rhea americana	REA	Ν	Struthioniformes	Rheidae
Brushland tinamou	Nothoprocta cinerascens	BTI	0	Tinamiformes	Tinamidae
Elegant crested-tinamou	Euotromia elegans	CTI	0	Tinamiformes	Tinamidae
Great tinamou	Tinamus major	GTI	Ο	Tinamiformes	Tinamidae
Brown-rumped buttonquail	Turnix nana	BRQ	Р	Turniciformes	Turnicidae
Small buttonquail	Turnix sylvatica	BUQ	Р	Turniciformes	Turnicidae

Abbreviation printing conc. final mathematical mathe	PANE	L_A				PANEL	В		
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11 CNS (21) 0.6 0.01 %T EVX (15) 0.6 0.01 %T Egg white-small scale 13 COF (22) 0.6 0.01 %T CFI (16) 0.6 0.01 %T Egg white-small scale 14 CP (24) 0.6 0.01 %T CFI (16) 0.6 0.01 %T Egg white-small scale 15 Transform/Invertage 0.5 0.01 %T Egg white-small scale Egg white-small scale 16 CT (25) 0.6 0.01 %T CMC (19) 0.6 0.01 %T Egg white-small scale 17 CT (27) 0.6 0.01 %T CMC (25) 0.6 0.01 %T Egg white-small scale 20 GT (33) 0.6 0.01 %T ENU (29) 0.6 0.01 %T Egg white-small scale 21 Fetuin 0.5 0.01 %T EGG (30) 0.6 0.01 %T Egg white-small scale 23 HOS (57) 0.6 0.01 %T Egg white-small scale Egg white-small scale 24 RLW 0.6 0.01 %T <td< th=""><th>10</th><th>CNG</th><th>(20)</th><th>0.6</th><th>0.01 %T</th><th>BRQ (11)</th><th>0.6</th><th>0.01 %T</th><th>Egg white - small scale</th></td<>	10	CNG	(20)	0.6	0.01 %T	BRQ (11)	0.6	0.01 %T	Egg white - small scale
13 CVM 0.5 0.05 0.015 MT devogetating (dirken egg white) 13 CP (22) 0.6 0.01 MT CP (24) 0.6 0.01 MT Egg white - small scale 14 CP (24) 0.6 0.01 MT Egg white - small scale CP (24) 15 Transferru/Investate 0.6 0.01 MT Egg white - small scale 16 CT (28) 0.6 0.01 MT Egg white - small scale 17 CTP (27) 0.6 0.01 MT Egg white - small scale 20 GT (34) 0.6 0.01 MT Egg white - small scale 21 Feturin 0.5 0.01 MT Egg white - small scale 21 Feturin 0.5 0.01 MT Egg white - small scale 22 GQ (153) 0.6 0.01 MT Feturin 0.5 0.01 MT 23 HGL (36) 0.6 0.01 MT Egg white - small scale 0.01 MT 24 PEW 0.6 0.01 MT Egg white - small scale 0.01 MT 25	11	CNS	(21)	0.6	0.01 %T	BWS (15)	0.6	0.01 %T	Egg white - small scale
13 COF (22) 0.6 0.0.3 MT CGC (13) 0.6 0.0.1 MT Egg white - small scale 14 CY (24) 0.6 0.0.1 MT CGC (13) 0.6 0.0.1 MT Egg white - small scale 15 CTP (27) 0.6 0.0.1 MT Egg white - small scale CMC (19) 0.6 0.0.1 MT Egg white - small scale 17 CTP (27) 0.6 0.0.1 MT CMC (19) 0.6 0.0.1 MT Egg white - small scale 19 GFT (33) 0.6 0.0.1 MT CRC (25) 0.6 0.0.1 MT Egg white - small scale 20 GT (34) 0.6 0.0.1 MT Egg white - small scale CMC (19) 0.6 0.0.1 MT Egg white - small scale 21 Fetuin 0.5 0.0.1 MT Fetuin 0.6 0.0.1 MT Egg white - small scale 23 HOL (35) 0.6 0.0.1 MT Egg white - small scale CMC (19) 0.6 0.0.1 MT Egg white - small scale 24 PEW 0.6 0.0.1 MT Egg white	12	OVN	/ 0.5	0.5	0.015 %T	OVM 0.5	0.5	0.015 %T	glycoprotein (chicken egg white)
14 CP(124) 0.6 0.03 YT Egg white - small scale 15 Transferm/merchance 0.5 0.01 YT Egg white - small scale 16 CT(126) 0.6 0.01 YT Egg white - small scale 17 CTP (27) 0.6 0.01 YT Egg white - small scale 18 ASF 0.6 0.01 YT Egg white - small scale 20 GT(134) 0.6 0.01 YT Egg white - small scale 21 Fetuin 0.5 0.01 YT Egg white - small scale 21 Fetuin 0.6 0.01 YT Egg white - small scale 22 GU(135) 0.6 0.01 YT Egg white - small scale 23 HG(130) 0.6 0.01 YT Egg white - small scale 24 PEW 0.6 0.01 YT Egg white - small scale 25 HOS (37) 0.6 0.01 YT Egg white - small scale 26 MGA (42) 0.6 0.01 YT Egg white - small scale 26 MGA (42) 0.6	13	COF	(22)	0.6	0.01 %T	CFI (16)	0.6	0.01 %T	Egg white - small scale
15 Transferrin/Invertage 0.5 0.01 %T Fransferrin/Invertage 0.5 0.01 %T Egg white - small scale 17 CTP (27) 0.6 0.01 %T CPC (23) 0.6 0.01 %T Egg white - small scale 18 ASF 0.5 0.01 %T CPC (23) 0.6 0.01 %T Egg white - small scale 20 GT (24) 0.6 0.01 %T CPC (23) 0.6 0.01 %T Egg white - small scale 21 Fetuin 0.5 0.01 %T CCC (30) 0.6 0.01 %T Egg white - small scale 22 GU (33) 0.6 0.01 %T GCC (30) 0.6 0.01 %T Egg white - small scale 23 HBC (32) 0.6 0.01 %T GFW (32) 0.6 0.01 %T Egg white - small scale 24 PEW 0.6 0.01 %T GFW (32) 0.6 0.01 %T Egg white - small scale 25 HOS (37) 0.6 0.01 %T GFW (32) 0.6 0.01 %T Egg white - small scale	14	CPI	(24)	0.6	0.01 %T	CGC (18)	0.6	0.01 %T	Egg white - small scale
16 CT (12) 0.6 0.01%T CMC (19) 0.6 0.01%T Egg white - small scale 17 CT (12) 0.6 0.01%T CPF (23) 0.6 0.01%T Egg white - small scale 19 GPT (33) 0.6 0.01%T CPF (23) 0.6 0.01%T Egg white - small scale 20 GT (14) 0.6 0.01%T EMU (29) 0.6 0.01%T Egg white - small scale 21 Fetuin 0.5 0.01%T CGC (30) 0.6 0.01%T Egg white - small scale 22 GU (35) 0.6 0.01%T CGC (30) 0.6 0.01%T Egg white - small scale 24 PEW 0.6 0.01%T GFN (32) 0.6 0.01%T Egg white - small scale 27 GW 0.6 0.01%T IPP (39) 0.6 0.01%T Egg white - small scale 28 MCP (46) 0.6 0.01%T IPP (39) 0.6 0.01%T Egg white - small scale 29 MTQ (48)	15	Transferrin	/Invertas	e 0.5	0.01 %T	Transferrin/Invertas	e 0.5	0.01 %T	glycoprotein
17 CFP (27) 0.6 0.01 %T Egg white - small scale 18 ASE 0.5 0.01 %T Egg white - small scale 19 GPT (33) 0.6 0.01 %T CRC (25) 0.6 0.01 %T Egg white - small scale 20 GTI (34) 0.6 0.01 %T EMU (29) 0.6 0.01 %T Egg white - small scale 21 Fetuin 0.5 0.01 %T EGC (30) 0.6 0.01 %T Egg white - small scale 23 HGL (35) 0.6 0.01 %T GCG (30) 0.6 0.01 %T Egg white - small scale 25 HOS (37) 0.6 0.01 %T GFV (32) 0.6 0.01 %T Egg white - small scale 26 MGA (42) 0.6 0.01 %T Egg white - small scale Cale 27 GEW 0.6 0.01 %T Egg white - small scale 27 GEW 0.6 0.01 %T Egg white - small scale 28 MCP (48) 0.6 0.01 %T Egg white - small scale <tr< th=""><th>16</th><th>CTI</th><th>(26)</th><th>0.6</th><th>0.01 %T</th><th>CMC (19)</th><th>0.6</th><th>0.01 %T</th><th>Egg white - small scale</th></tr<>	16	CTI	(26)	0.6	0.01 %T	CMC (19)	0.6	0.01 %T	Egg white - small scale
18 ASF 0.5 0.01 %T ASF 0.5 0.01 %T effectore 19 GPT (33) 0.6 0.01 %T CR(25) 0.6 0.01 %T Egg white - small scale 20 GTI (34) 0.6 0.01 %T Feture 0.5 0.01 %T Egg white - small scale 21 Feture 0.5 0.01 %T GC0 (30) 0.6 0.01 %T Egg white - small scale 22 GUI (35) 0.6 0.01 %T GCM (31) 0.6 0.01 %T Egg white - small scale 24 PEW 0.6 0.01 %T GFM (32) 0.6 0.01 %T Egg white - small scale 25 HOS (37) 0.6 0.01 %T GFM (32) 0.6 0.01 %T Egg white - small scale 26 MGA (46) 0.6 0.01 %T Egg white - small scale GC 27 GEW 0.6 0.01 %T Egg white - small scale GC GC 28 MGP (46) 0.6 0.01 %T IBH (40) 0.6 0	17	СТР	(27)	0.6	0.01 %T	CPF (23)	0.6	0.01 %T	Egg white - small scale
19 GPT (33) 0.6 0.01 %T CRC (25) 0.6 0.01 %T Egg white - small scale 20 GT (34) 0.6 0.01 %T Feture 0.5 0.01 %T Egg white - small scale 21 Feture 0.5 0.01 %T Egg white - small scale 23 HGL (35) 0.6 0.01 %T GCC (30) 0.6 0.01 %T Egg white - small scale 24 PEW 0.6 0.01 %T GCC (31) 0.6 0.01 %T Egg white - small scale 25 HOS (37) 0.6 0.01 %T GFK (32) 0.6 0.01 %T Egg white - small scale 26 MGA (42) 0.6 0.01 %T GFK (32) 0.6 0.01 %T Egg white - small scale 28 MGP (46) 0.6 0.01 %T LBK (41) 0.6 0.01 %T Egg white - small scale 30 PPW (51) 0.6 0.01 %T Egg white - small scale 1.06 31 OEW 0.6 0.01 %T MDEV 0.6 0.01 %T </th <th>18</th> <th>A</th> <th>SF</th> <th>0.5</th> <th>0.01 %T</th> <th>ASF</th> <th>0.5</th> <th>0.01 %T</th> <th>glycoprotein</th>	18	A	SF	0.5	0.01 %T	ASF	0.5	0.01 %T	glycoprotein
20 GTI (34) 0.6 0.01 %T EMU (29) 0.6 0.02 %T Egg white - small scale 21 Fetuin 0.5 0.01 %T GCG (30) 0.6 0.01 %T Egg white - small scale 22 GUI (35) 0.6 0.01 %T GCG (30) 0.6 0.01 %T Egg white - small scale 23 HGL (36) 0.6 0.01 %T GCM (31) 0.6 0.01 %T Egg white - small scale 24 PEW 0.6 0.01 %T GCM (32) 0.6 0.01 %T Egg white - small scale 25 MGG (40) 0.6 0.01 %T HPE (38) 0.6 0.01 %T Egg white - small scale 26 MGP (46) 0.6 0.01 %T LGR (40) 0.6 0.01 %T Egg white - small scale 29 MTC (48) 0.6 0.01 %T LGR (40) 0.6 0.01 %T Egg white - small scale 31 QEW 0.6 0.01 %T MCP (3) 0.6 0.01 %T Egg white - small scale 32	19	GPT	(33)	0.6	0.01 %T	CRC (25)	0.6	0.01 %T	Egg white - small scale
21 Fetuin 0.5 0.01 %T Fetuin 0.5 0.01 %T glycoprotein 22 GUI (35) 0.6 0.01 %T GCG (30) 0.6 0.01 %T Egg white - small scale 23 HGL (36) 0.6 0.01 %T GCG (31) 0.6 0.01 %T Egg white - small scale 24 PEW 0.6 0.01 %T GFK (32) 0.6 0.01 %T Egg white - small scale 25 MGA (42) 0.6 0.01 %T GFK (32) 0.6 0.01 %T Egg white - small scale 26 MGP (46) 0.6 0.01 %T JPC (39) 0.6 0.01 %T Egg white - small scale 28 MGP (46) 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 30 PWD (51) 0.6 0.01 %T LBW (40) 0.6 0.01 %T Egg white - small scale 31 GEW 0.6 0.01 %T MDC (41) 0.6 0.01 %T Egg white - small scale 34 DEW	20	GTI	(34)	0.6	0.01 %T	EMU (29)	0.6	0.01 %T	Egg white - small scale
22 GU (13) 0.6 0.01 %T GCG (30) 0.6 0.01 %T Egg white - small scale 23 HGL (36) 0.6 0.01 %T GCM (31) 0.6 0.01 %T Egg white - small scale 24 PEW 0.6 0.01 %T FPW 0.6 0.01 %T Egg white - small scale 25 HOS (37) 0.6 0.01 %T GFN (32) 0.6 0.01 %T Egg white - small scale 26 MGA (42) 0.6 0.01 %T GFN (32) 0.6 0.01 %T Egg white - small scale 27 GEW 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 29 MTQ (49) 0.6 0.01 %T LGK (41) 0.6 0.01 %T Egg white - small scale 30 PWD (51) 0.6 0.01 %T MDF (43) 0.6 0.01 %T Egg white - small scale 31 GEW 0.6 0.01 %T MDF (43) 0.6 0.01 %T Egg white - small scale 32 RCU (52)	21	Fet	uin	0.5	0.01 %T	Fetuin	0.5	0.01 %T	glycoprotein
23 HGL (36) 0.6 0.01 %T GCM (31) 0.6 0.01 %T Egg white - small scale 24 PEW 0.6 0.01 %T GFN (32) 0.6 0.01 %T Egg white - small scale 25 HOS (37) 0.6 0.01 %T Egg white - small scale 0.6 26 MGA (42) 0.6 0.01 %T Egg white - small scale 0.6 27 GEW 0.6 0.01 %T Egg white - small scale 0.6 28 MGP (46) 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 30 PVND (51) 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 31 OEW 0.6 0.01 %T MLF (43) 0.6 0.01 %T Egg white - small scale 32 RCU (52) 0.6 0.01 %T MLF (43) 0.6 0.01 %T Egg white - small scale 33 RD (55) 0.6 0.01 %T MEF (47) 0.6 0.01 %T Egg white -	22	GUI	(35)	0.6	0.01 %T	GCG (30)	0.6	0.01 %T	Egg white - small scale
PEW 0.6 0.01 %T PEW 0.6 0.01 %T Erg white - strage scale 25 HOS (37) 0.6 0.01 %T GFN (32) 0.6 0.01 %T Egg white - small scale 26 MGA (42) 0.6 0.01 %T HPE (38) 0.6 0.01 %T Egg white - small scale 27 GEW 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 29 MTQ (48) 0.6 0.01 %T LGK (41) 0.6 0.01 %T Egg white - small scale 30 PVD (51) 0.6 0.01 %T LGK (41) 0.6 0.01 %T Egg white - small scale 31 OEW 0.6 0.01 %T MDC (44) 0.6 0.01 %T Egg white - small scale 32 RCU (52) 0.6 0.01 %T MOD (44) 0.6 0.01 %T Egg white - small scale 34 DEW 0.6 0.01 %T MDE (47) 0.6 0.01 %T Egg white - small scale 36 RFD (55) 0.6 </th <th>23</th> <th>HGL</th> <th>(36)</th> <th>0.6</th> <th>0.01 %T</th> <th>GCM (31)</th> <th>0.6</th> <th>0.01 %T</th> <th>Egg white - small scale</th>	23	HGL	(36)	0.6	0.01 %T	GCM (31)	0.6	0.01 %T	Egg white - small scale
25 HOS (37) 0.6 0.01%T FR (32) 0.6 0.01%T Egg white - small scale 26 MGA (42) 0.6 0.01%T HPE (38) 0.6 0.01%T Egg white - small scale 27 GEW 0.6 0.01%T Egg white - small scale Egg white - small scale 28 MGP (46) 0.6 0.01%T LBH (40) 0.6 0.01%T Egg white - small scale 30 PWD (51) 0.6 0.01%T LGK (41) 0.6 0.01%T Egg white - small scale 31 OCW 0.6 0.01%T ME (43) 0.6 0.01%T Egg white - small scale 32 RCU (52) 0.6 0.01%T ME (43) 0.6 0.01%T Egg white - small scale 33 RD (53) 0.6 0.01%T MDE (44) 0.6 0.01%T Egg white - small scale 34 DEW 0.6 0.01%T Egg white - small scale Scale 35 RED (55) 0.6 0.01%T MDE (47) 0.6 </th <th>24</th> <th>PE</th> <th>W</th> <th>0.6</th> <th>0.01 %T</th> <th>PEW</th> <th>0.6</th> <th>0.01 %T</th> <th>Egg white - large scale</th>	24	PE	W	0.6	0.01 %T	PEW	0.6	0.01 %T	Egg white - large scale
26 MGA (42) 0.6 0.01 %T HPE (38) 0.6 0.01 %T Egg white - small scale 27 GEW 0.6 0.01 %T IPC (39) 0.6 0.01 %T Egg white - small scale 28 MGP (46) 0.6 0.01 %T IPC (39) 0.6 0.01 %T Egg white - small scale 29 MTQ (48) 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 30 PWD (51) 0.6 0.01 %T LGK (41) 0.6 0.01 %T Egg white - small scale 31 OEW 0.6 0.01 %T MLF (43) 0.6 0.01 %T Egg white - small scale 32 RCD (52) 0.6 0.01 %T MDF (43) 0.6 0.01 %T Egg white - small scale 34 DEW 0.6 0.01 %T MDF (45) 0.6 0.01 %T Egg white - small scale 35 RED (55) 0.6 0.01 %T MDF (45) 0.6 0.01 %T Egg white - small scale 37 CE	25	HOS	(37)	0.6	0.01 %T	GFN (32)	0.6	0.01 %T	Egg white - small scale
27 GEW 0.6 0.01 %T GEW 0.6 0.01 %T Egg white - small scale 28 MGP (46) 0.6 0.01 %T JPC (39) 0.6 0.01 %T Egg white - small scale 29 MTQ (48) 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 30 PWD (51) 0.6 0.01 %T QEW 0.6 0.01 %T Egg white - small scale 31 QEW 0.6 0.01 %T MLF (43) 0.6 0.01 %T Egg white - small scale 32 RCU (52) 0.6 0.01 %T MDD (44) 0.6 0.01 %T Egg white - small scale 33 RDR (53) 0.6 0.01 %T MEP (45) 0.6 0.01 %T Egg white - small scale 34 DEW 0.6 0.01 %T MEP (47) 0.6 0.01 %T Egg white - small scale 35 RED (55) 0.6 0.01 %T MKP (47) 0.6 0.01 %T Egg white - small scale 36 RFG (56) <th>26</th> <th>MGA</th> <th>. (42)</th> <th>0.6</th> <th>0.01 %T</th> <th>HPE (38)</th> <th>0.6</th> <th>0.01 %T</th> <th>Egg white - small scale</th>	26	MGA	. (42)	0.6	0.01 %T	HPE (38)	0.6	0.01 %T	Egg white - small scale
28 MGP (46) 0.6 0.01 %T IPC (39) 0.6 0.01 %T Egg white - small scale 29 MTQ (48) 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 30 PWD (51) 0.6 0.01 %T LGK (41) 0.6 0.01 %T Egg white - small scale 31 OEW 0.6 0.01 %T MLF (43) 0.6 0.01 %T Egg white - small scale 32 RCU (52) 0.6 0.01 %T MDC (44) 0.6 0.01 %T Egg white - small scale 33 RDR (53) 0.6 0.01 %T MDEW 0.6 0.01 %T Egg white - small scale 34 DEW 0.6 0.01 %T MPE (45) 0.6 0.01 %T Egg white - small scale 35 RED (55) 0.6 0.01 %T MPE (45) 0.6 0.01 %T Egg white - small scale 37 CEW 0.6 0.01 %T MPE (45) 0.6 0.01 %T Egg white - small scale 38 R17 (5	27	GE	W	0.6	0.01 %T	GEW	0.6	0.01 %T	Egg white - large scale
29 MTQ (48) 0.6 0.01 %T LBH (40) 0.6 0.01 %T Egg white - small scale 30 PWD (51) 0.6 0.01 %T LGK (41) 0.6 0.01 %T Egg white - small scale 31 OEW 0.6 0.01 %T MLF (43) 0.6 0.01 %T Egg white - small scale 32 RCU (52) 0.6 0.01 %T MDO (44) 0.6 0.01 %T Egg white - small scale 34 DEW 0.6 0.01 %T MDO (44) 0.6 0.01 %T Egg white - small scale 35 RED (55) 0.6 0.01 %T MPE (45) 0.6 0.01 %T Egg white - small scale 36 RFG (56) 0.6 0.01 %T MWE (47) 0.6 0.01 %T Egg white - small scale 37 CEW 0.6 0.01 %T MVS (49) 0.6 0.01 %T Egg white - small scale 38 R17 (57) 0.6 0.01 %T RAS (54) 0.6 0.01 %T Egg white - small scale 39 RK	28	MGP	(46)	0.6	0.01 %T	JPC (39)	0.6	0.01 %T	Egg white - small scale
30 PVD (51) 0.6 0.01%T LGK (41) 0.6 0.01%T Egg white - small scale 31 QEW 0.6 0.01%T QEW 0.6 0.01%T Egg white - large scale 32 RCU (52) 0.6 0.01%T MKF (43) 0.6 0.01%T Egg white - small scale 33 RDR (53) 0.6 0.01%T MVD (44) 0.6 0.01%T Egg white - small scale 34 DEW 0.6 0.01%T MVD (44) 0.6 0.01%T Egg white - small scale 36 RFG (55) 0.6 0.01%T MPE (45) 0.6 0.01%T Egg white - small scale 37 CEW 0.6 0.01%T MVS (49) 0.6 0.01%T Egg white - small scale 38 RT (57) 0.6 0.01%T OST (50) 0.6 0.01%T Egg white - small scale 40 AGP 0.5 0.01%T REA (54) 0.6 0.01%T Egg white - small scale 41 SCQ (61) 0.6 </th <th>29</th> <th>MTQ</th> <th>(48)</th> <th>0.6</th> <th>0.01 %T</th> <th>LBH (40)</th> <th>0.6</th> <th>0.01 %T</th> <th>Egg white - small scale</th>	29	MTQ	(48)	0.6	0.01 %T	LBH (40)	0.6	0.01 %T	Egg white - small scale
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Table S2. Two printing panels of EW microarray. The samples are listed based on their printing location.

Additional figures



Figure S3. PHA-E lectin binding profile across all EWs. Sample bar chart demonstrating range of binding on the microarray. Error bars are one standard deviation for the mean of all replicates (Supplementary **Table S3**).



Figure S4. *N*-linked structures unique for either Anseriformes or Galliformes previously reported.⁶ Coloured rectangles indicate epitopes for interactions with lectins used in this study (**Table 1**).



Figure S5. Bar charts for SNA-I and MAA lectin binding to the 28 species representing Anseriformes and Galliformes included in this study. Pie charts indicate proportions of MAA and SNA-I within total intensity of each order. Error bars are one standard deviation for the mean of all replicates (Supplementary **Table S3**).



Figure S6. Phylogenic tree of birds used in this study according to DNA-DNA hybridisation¹ (adapted from Suzuki, *et al.*, 2004²). The examples of birds were taken from Supplementary **Table S-1** and listed together with a total number of species represented for each order used in this study. The overlap with birds analysed by Suzuki, *et al.*, $(2004)^2$ is indicated, and the results for Con A and GS-I versus GS-I-B4 are summarised in comparison to this study.

REFERENCES

1. Sibley, C. G. & Monroe Jr, B. L. Taxonomy and distribution of the birds of the world. Yale University Press, New Haven, Connecticut, USA, 1990.

2. Suzuki, N., Laskowski, M. & Lee, Y. C. Phylogenetic expression of Galalpha1-4Gal on avian glycoproteins: glycan differentiation inscribed in the early history of modern birds. *Proc. Natl. Acad. Sci. U. S. A.* **101**, 9023–9028 (2004).

3. Kovacs-Nolan, J., Phillips, M. & Mine, Y. Advances in the value of eggs and egg components for human health. *J. Agric. Food Chem.* **53**, 8421–8431 (2005).

4. Kilcoyne, M. *et al.* Construction of a natural mucin microarray and interrogation for biologically relevant glyco-epitopes. *Anal. Chem.* **84**, 3330–3338 (2012).

5. Kilcoyne, M. et al. Campylobacter jejuni strain discrimination and temperature-dependent glycome expression profiling by lectin microarray. *Carbohydr. Res.* **389**, 123–133 (2014).

6. Plasencia, M. D., Isailovic, D., Merenbloom, S. I., Mechref, Y. & Clemmer, D. E. Resolving and sssigning N-linked glycan structural isomers from ovalbumin by IMS-MS. *J. Am. Soc. Mass Spectrom.* **19**, 1706–1715 (2008).

7. Gerlach, J. Q., Kilcoyne, M. & Joshi, L. Microarray evaluation of the effects of lectin and glycoprotein orientation and data filtering on glycoform discrimination. *Anal. Methods* **6**, 440 (2014).