

## THE COCHINEAL FONT PACKAGE

MICHAEL SHARPE

Cochineal is a fork of Crimson, a remarkable creation of Sebastian Kosch inspired by oldstyle font designers. The name Cochineal is intended to suggest that, while it is crimson, there may be bugs involved. More than 1500 glyphs were added to Crimson, allowing a more than a modest chance that some poor spacing or kerning or accent placement might have been introduced. Such problems will occur in the less frequented parts of the fonts, and I would appreciate reports of problems you may discover. You are unlikely to trip over issues if you stay within the bounds of, say, the T1 encoding. I did correct problems in a number of glyphs from Crimson that FontForge uncovered and that could have led to poor rendition on some platforms, especially OS X. I also changed the emsize to 1000 (the standard for PostScript-flavored Opentype) from the Crimson value of 1024 and rescaled accordingly.

Cochineal provides Roman, Bold, *Italic* and **BoldItalic**. (Crimson provided semibold weights but with only limited coverage, which I did not wish to extend as this would have required the creation of about 2000 additional glyphs. Bob Tennent's Crimson package does support semibold and the other styles, though without my additions.)

### PACKAGE FEATURES:

In addition to the encodings OT1, T1, TS1, LY1 in general use by Western European (and some Eastern European) scripts, the package also offers LGR with full support for monotonic, polytonic and some ancient Greek, and T2A and OT2 Cyrillic support. All allow a choice from four figure styles—TLF (tabular lining figures, monospaced and uppercase), LF (proportional lining figures, uppercase), TOSF (tabular oldstyle figures, monospaced and lowercase) and OSF (proportional oldstyle figures, lowercase). The encodings OT1, T1, TS1, LY1 offer SMALL CAPS, even *ITALICS SMALL CAPS*, and additional figure styles—superiors, inferiors and denominators. These features are available from either fontspec or from [pdf]L<sup>A</sup>T<sub>E</sub>X. In L<sup>A</sup>T<sub>E</sub>X, you access these through the macros `\textsu`, `\textin` and `\textde`, or through their font-switching equivalents `\sufigures`, `\infigures` and `\defigures`. For example:

- `M\textsu{lle}` Dupont and `M{\sufigures lle}` Dupont both produce M<sup>lle</sup> Dupont.
- `{\infigures 12345}` and `\textin{12345}` render as <sub>12345</sub>, dipping noticeably below the baseline, while `{\defigures 12345}` and `\textde{12345}` render as <sub>12345</sub>, aligned with the baseline.

### PACKAGE OPTIONS AND MACROS:

The package defines two macros, `\useosf` and `\useproportional`, useable only in the preamble, which determine the default figure style in text. A typical invocation would be something like

```
\usepackage{cochineal} % default figure style is tabular, lining
% load sans and typewriter fonts
% load a math font---it will use tabular lining figures in math
\useosf % switch from lining figures to oldstyle figures
\useproportional % switch from tabular to proportional
```

There is a simpler way to achieve essentially the same result, but with the advantage that the figure styles are not loaded until after the math package (if any) is loaded, so that math always uses the default tabular lining figures.

```
% If you use babel, load it here, before cochineal
\usepackage[p,osf]{cochineal} % default figure style is proportional, oldstyle
% load sans and typewriter fonts
% load a math font---it will use tabular lining figures in math
```

No matter what the default figure style in text, the package provides switches and macros to use any available figure style.

- `\textlf{}` and `\lfstyle` give proportional lining figures; `\texttlf{}` and `\tlfstyle` give tabular lining figures; `\textosf{}` and `\osfstyle` give proportional oldstyle figures; `\texttosf{}` and `\tosfstyle` give tabular oldstyle figures; `\textfrac{3}{4}` uses superior and denominator figures to make the fraction  $\frac{3}{4}$ .

The options that can be passed to `cochineal.sty` are the following:

- `scale` or `scaled`: a magnification factor—e.g., `scaled=1.02` enlarges all text controlled by the package by 2%;
- `p`, or `proportional`: make proportional figures the default rather than tabular; `lf`, or `lining`: make lining figures the default (this is already the default); `osf`, or `oldstyle`: make oldstyle figures the default rather than lining;
- `sup`s: use superior figures to make footnote markers, rather than the L<sup>A</sup>T<sub>E</sub>X's default markers;
- `swashQ`: use Cochineal's swash instead of its tamer default version, ;
- `scof`: always use oldstyle figures within a small caps block;
- `theoremfont`: for theorem statements in the plain style, use a doctored version of italics that has upright figures, braces, brackets, parentheses, exclamation mark, colon and semicolon.

## MATHEMATICAL ACCOMPANIMENT

The package contains fonts for use as math letters that are derived from Cochineal Roman and Greek glyphs and the newtxmath family. Note that  $\nu$  and  $\nu$  (Greek nu) are quite distinct. Here's a sample.

```
% preamble should include, in this order:
\usepackage[T1]{fontenc}
% load babel here
\usepackage[p,osf]{cochineal}
\usepackage[varqu,varl,var0]{inconsolata}
\usepackage[scale=.95,type1]{cabin}
\usepackage[cochineal,vvarbb]{newtxmath}
\usepackage[cal=boondoxo]{mathalfa}
```

The typeset math below follows the ISO recommendations that only variables be set in italic. Note the use of upright shapes for  $d$ ,  $e$  and  $\pi$ . (The first two are entered as `\mathrm{d}` and `\mathrm{e}`, and in fonts derived from `mtpro2` or `newtxmath`, the latter is entered as `\uppi`.)

**Simplest form of the Central Limit Theorem:** Let  $X_1, X_2, \dots$  be a sequence of iid random variables with mean 0 and variance 1 on a probability space  $(\Omega, \mathcal{F}, \mathbb{P})$ . Then

$$\mathbb{P}\left(\frac{X_1 + \dots + X_n}{\sqrt{n}} \leq v\right) \rightarrow \mathfrak{N}(v) := \int_{-\infty}^v \frac{e^{-t^2/2}}{\sqrt{2\pi}} dt \quad \text{as } n \rightarrow \infty,$$

or, equivalently, letting  $S_n := \sum_1^n X_k$ ,

$$\mathbb{E}f\left(S_n/\sqrt{n}\right) \rightarrow \int_{-\infty}^{\infty} f(t) \frac{e^{-t^2/2}}{\sqrt{2\pi}} dt \quad \text{as } n \rightarrow \infty, \text{ for every } f \in \mathcal{BC}(\mathbb{R}).$$

# TYPESETTING GREEK WITH L<sup>A</sup>T<sub>E</sub>X

Cochineal offers a rather complete LGR-encoded glyph collection, lacking just a few ancient symbols.

	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	– 0	ˆ 1	2	3	4	5	ς 6	ς 7	ˆ0x
´01x	ˆ 8	À 9	Η 10	Ω 11	Α 12	Ÿ 13	α 14	ü 15	
´02x	ˆ 16	ˆ 17	ı 18	ϙ 19	20	Q 21	ς 22	Ϡ 23	ˆ1x
´03x	€ 24	% 25	ə 26	ɹ 27	ˆ 28	ˆ 29	ˆ 30	ˆ 31	
´04x	ˆ 32	! 33	ˆ 34	ˆ 35	ˆ 36	% 37	ˆ 38	ˆ 39	ˆ2x
´05x	( 40	) 41	* 42	+ 43	, 44	- 45	. 46	/ 47	
´06x	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	ˆ3x
´07x	8 56	9 57	: 58	· 59	ˆ 60	= 61	ˆ 62	; 63	
´10x	ˆ 64	A 65	B 66	ˆ 67	Δ 68	E 69	Φ 70	Γ 71	ˆ4x
´11x	H 72	I 73	Θ 74	K 75	Λ 76	M 77	N 78	O 79	
´12x	Π 80	Χ 81	Ρ 82	Σ 83	Τ 84	Υ 85	ˆ 86	Ω 87	ˆ5x
´13x	Ξ 88	Ψ 89	Z 90	[ 91	ˆ 92	] 93	ˆ 94	ˆ 95	
´14x	ˆ 96	α 97	β 98	ς 99	δ 100	ε 101	φ 102	γ 103	ˆ6x
´15x	η 104	ι 105	θ 106	κ 107	λ 108	μ 109	ν 110	ο 111	
´16x	π 112	χ 113	ρ 114	σ 115	τ 116	υ 117	118	ω 119	ˆ7x
´17x	ξ 120	ψ 121	ζ 122	« 123	ˆ 124	» 125	ˆ 126	— 127	
´20x	ά 128	ά 129	ά 130	ά 131	ά 132	ά 133	ά 134	ά 135	ˆ8x
´21x	ά 136	ά 137	ά 138	ά 139	ά 140	ά 141	ά 142	ά 143	
´22x	ά 144	ά 145	ά 146	ά 147	ά 148	ά 149	ά 150	ˆ 151	ˆ9x
´23x	ή 152	ή 153	ή 154	155	ή 156	ή 157	ή 158	159	
´24x	ή 160	ή 161	ή 162	ή 163	ή 164	ή 165	ή 166	ή 167	ˆAx
´25x	ή 168	ή 169	ή 170	ή 171	ή 172	ή 173	ή 174	ή 175	
´26x	ώ 176	ώ 177	ώ 178	ώ 179	ώ 180	ώ 181	ώ 182	ώ 183	ˆBx
´27x	ώ 184	ώ 185	ώ 186	ώ 187	ώ 188	ώ 189	ώ 190	ώ 191	
´30x	ώ 192	ώ 193	ώ 194	F 195	ώ 196	ώ 197	ώ 198	199	ˆCx
´31x	ì 200	ì 201	ì 202	ì 203	ù 204	ù 205	ù 206	ù 207	
´32x	í 208	í 209	í 210	ì 211	ú 212	ù 213	ù 214	ù 215	ˆDx
´33x	ĩ 216	ĩ 217	ĩ 218	İ 219	ü 220	ü 221	ü 222	Ÿ 223	
´34x	è 224	é 225	é 226	é 227	ò 228	ó 229	ò 230	ò 231	ˆEx
´35x	é 232	é 233	é 234	é 235	ó 236	ó 237	ó 238	ó 239	
´36x	ï 240	ï 241	ï 242	ï 243	ü 244	ü 245	ü 246	ü 247	ˆFx
´37x	α 248	η 249	ω 250	ρ 251	ρ 252	253	ˆ 254	ˆ 255	
	ˆ8	ˆ9	ˆA	ˆB	ˆC	ˆD	ˆE	ˆF	

Setting up your source file to use LGR usually involves `babel` and `substitutefont`. See the documentation of `nimbus15` for details.

## TYPESETTING RUSSIAN

With T2A encoding, the process is the same as with other T2A-encoded fonts, though the gaps in coverage may affect users of a number of non-Russian Cyrillic scripts. The only figure style provided is tabular lining (TLF.)

	ó	í	ú	ý	ä	å	ö	÷	
00x	°	´	ˆ	˜	¨	˘	°	˘	0x
01x	˘	˘	˘	˘	˘	˘	˘	˘	
02x	“	”	ˆ	˜	¨	˘	˘	˘	1x
03x	24	1 25	j 26	ff 27	fi 28	fl 29	ffi 30	ffl 31	
04x	32	!	"	#	\$	%	&	'	2x
05x	(	)	*	+	,	-	.	/	
06x	0	1	2	3	4	5	6	7	3x
07x	8	9	:	;	<	=	>	?	
10x	@	A	B	C	D	E	F	G	4x
11x	H	I	J	K	L	M	N	O	
12x	P	Q	R	S	T	U	V	W	5x
13x	X	Y	Z	[	\	]	^	_	
14x	‘	a	b	c	d	e	f	g	6x
15x	h	i	j	k	l	m	n	o	
16x	p	q	r	s	t	u	v	w	7x
17x	x	y	z	{		}	~	-	
20x	128	129	Ѓ	Ѕ	132	133	134	Љ	8x
21x	Ї	137	138	139	140	141	142	Ѕ	
22x	144	145	Ў	147	148	149	Ц	151	9x
23x	152	Є	154	Ѓ	Ѕ	Ѓ	Ѕ	159	
24x	160	161	ђ	ђ	164	165	166	Љ	Ax
25x	168	169	170	171	172	173	174	Ѕ	
26x	176	177	Ў	179	180	181	Ц	183	Bx
27x	184	Є	185	Ѓ	Ѕ	„	«	»	
30x	А	Б	В	Г	Д	Е	Ж	З	Cx
31x	И	Й	К	Л	М	Н	О	П	
32x	Р	С	Т	У	Ф	Х	Ц	Ч	Dx
33x	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я	
34x	а	б	в	г	д	е	ж	з	Ex
35x	и	й	к	л	м	н	о	п	
36x	р	с	т	у	ф	х	ц	ч	Fx
37x	ш	щ	ъ	ы	ь	э	ю	я	
	“8	“9	“A	“B	“C	“D	“E	“F	

The OT2 encoding (supposedly obsolete, but still useful) is intended for limited use in producing Russian characters with a Western keyboard, making by means of  $\text{\TeX}$  a transliteration of ASCII for most characters in the range 33–122, and providing ligatures to generate the rest. See the documentation of nimbus15 for further details.

	ó	í	ú	û	ü	ý	ö	ÿ	
00x	Ъ 0	Ь 1	Ц 2	Э 3	І 4	Є 5	Ђ 6	Ћ 7	"0x
01x	Ѓ 8	Ѕ 9	Ц 10	Э 11	І 12	Є 13	Ђ 14	Ћ 15	
02x	Ю 16	Ж 17	Й 18	Ё 19	Ѹ 20	Ѳ 21	Ѣ 22	Я 23	"1x
03x	Ю 24	Ж 25	Й 26	Ё 27	Ѹ 28	Ѳ 29	Ѣ 30	Я 31	
04x	“ 32	! 33	” 34	Ђ 35	˘ 36	% 37	’ 38	’ 39	"2x
05x	( 40	) 41	* 42	Ѓ 43	, 44	- 45	. 46	/ 47	
06x	0 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	"3x
07x	8 56	9 57	: 58	; 59	« 60	І 61	» 62	? 63	
10x	˘ 64	А 65	Б 66	Ц 67	Д 68	Е 69	Ф 70	Г 71	"4x
11x	Х 72	И 73	Ј 74	К 75	Л 76	М 77	Н 78	О 79	
12x	П 80	Ч 81	Р 82	С 83	Т 84	У 85	В 86	Щ 87	"5x
13x	Ш 88	Ы 89	З 90	[ 91	“ 92	] 93	Ь 94	Ђ 95	
14x	‘ 96	а 97	б 98	ц 99	д 100	е 101	ф 102	г 103	"6x
15x	Х 104	и 105	ј 106	к 107	л 108	м 109	н 110	о 111	
16x	п 112	ч 113	р 114	с 115	т 116	у 117	в 118	щ 119	"7x
17x	ш 120	ы 121	з 122	— 123	— 124	№ 125	Ъ 126	Ѓ 127	
	” 8	” 9	” A	” B	” C	” D	” E	” F	